CAN ATTITUDES BE TAUGHT?

A DISSERTATION
SUBMITTED TO THE BOARD OF UNIVERSITY STUDIES OF THE JOHNS HOPKINS UNIVERSITY IN CONFORMITY WITH THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY
1934

BY
ARTHUR LICHTENSTEIN

(Reprinted from "The Johns Hopkins University Studies in Education," Number 21)

BALTIMORE
THE JOHNS HOPKINS PRESS
1934

CAN ATTITUDES BE TAUGHT?

CAN ATTITUDES BE TAUGHT?

A DISSERTATION
SUBMITTED TO THE BOARD OF UNIVERSITY STUDIES OF THE JOHNS HOPKINS UNIVERSITY IN CONFORMITY WITH THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY
1934

BY
ARTHUR LICHTENSTEIN

(Reprinted from "The Johns Hopkins University Studies in Education," Number 21)

BALTIMORE
THE JOHNS HOPKINS PRESS
1934

COPYRIGHT 1934, THE JOHNS HOPKINS PRESS

PRINTED IN THE UNITED STATES OF AMERICA
BY J. H. FURST COMPANY, BALTIMORE, MARYLAND

ACKNOWLEDGMENT

The author wishes to express his grateful appreciation of the invaluable aid rendered by the members of his dissertation committee: Dr. J. M. Stephens, Professor Florence E. Bamberger, and Miss Frances R. Dearborn. Dr. E. E. Franklin and many members of the seminary have given helpful suggestions. Dr. D. E. Weglein, Dr. J. L. Stenquist, and Miss Mary Carroll of the Baltimore City Department of Education have been most kind and cooperative, as were the principals and teachers of the nine schools involved in the experiment. To the friends who helped with clerical work and with caustic criticism, the author also wishes to convey his thanks.

TABLE OF CONTENTS

PAGE

Tables ix

Chapter

I. The Problem 1

II. The Experiment 36

III. The Results 48

IV. Criticisms and Conclusions 68

V. Summary and Suggestions 75

Appendix A: Bibliography 79

B: The Tests 83

Vita 91

Digitized by the Internet Archive
in 2026

https://archive.org/details/IA41547018_0031

TABLES

TABLE		PAGE
I.	Summary of Studies Dealing With the Influence of Education on Certain Attitudes	26
II.	Experimental Set-Up First Semester	40
III.	Second Semester Set-Up	41
IV.	Results of Ballots for Entire Populations	48
V.	Results of Ballots for Groups Constant Through the Experiment Compared with Groups Shifting their Status at Mid-term	50
VI.	Results of Ballots for City Group Z	52
VII.	Analysis of Ballot Results by Grades	53
VIII.	Ballots of Second Semester: Two Choices	54
IX.	General Factors in Which First Semester Groups are Equated	55
X.	Results of the Garrett-Fisher Test: Equated Groups	55
XI.	Results of the Frederick Test: Equated Groups	56
XII.	Results of the Curtis Test: Equated Groups	56
XIII.	Results of Diaries: Equated Groups	57
XIV.	Results of Diaries: Original Groups	57
XV.	General Factors in Which Entire-Year Groups are Matched	58
XVI.	Results of Garrett-Fisher Test: Matched Groups	58
XVII.	Results of Frederick Tests: Matched Groups	59
XVIII.	Results of Curtis Test: Matched Groups	59
XIX.	Results of Diaries: Matched Groups	60
XX.	Comparing Results of 39 Matched Cases in Groups W, X, and Y	60
XXI.	Comparing 16 Matched Cases in Groups Y and Z	62
XXII.	Comparing 7 Matched Cases in Groups X and Z	62
XXIII.	Comparing 14 Matched Cases in Group Y and City Group Z	64
XXIV.	Comparing 14 Matched Cases in Group X and City Group Z	64
XXV.	Sex Differences in the Equated Groups	65
XXVI.	Correlations of Initial and Final Tests: Equated Groups	66
XXVII.	Intercorrelations of the Tests with Each Other and Correlations with C. A. and M. A	67

CHAPTER I

The Problem

I

"A social revolution may effect abrupt and deep alterations in external customs, in legal and political institutions," says John Dewey. "But the habits that are behind these institutions . . . are not so easily modified. . . . Ways of belief, of expectation, of judgment, and attendant emotional dispositions of like and dislike, are not easily modified after they have once taken shape." [1]

This quotation may be taken to represent the hypothesis of the present study. Education in general, schooling in particular, represent an effort of society to modify habits. Courses of study list among their expected outcomes certain gains in habits, gains in skill, and gains in attitudes. Our principal interest in this study is concerned with the latter: ways of belief, expectation and judgment, and attendant emotional dispositions of like and dislike, all of which may be curtly summed up as *attitudes.*

We are not concerned here with any more exact definition of an attitude than the one given above. Our chief concern is with what happens under certain conditions rather than with classification. Moore and Garrison,[2] and Sherman [3] have pointed out clearly the inanity of struggling over distinctions in definition instead of actual experimentation. Even the physical scientist, one imagines, would have some difficulty in defining electricity, for example, except in terms of what happens under certain conditions.*

[1] Dewey, John, Human Nature and Conduct, N. Y., Henry Holt & Co., 1922, part 2, sec. 3, p. 108.

[2] Moore, G. and Garrison, K. C., A Comparative Study of Social and Political Attitudes of College Students, J. Abn. & Soc. Psychol., 27 (1932), 195-208.

[3] Sherman, M., Theories and Measurement of Attitudes, Child Devel., 3 (1932), 15-28.

* The best recent discussion of definitions in this field is that of D. D. Droba, in J. Soc. Psychol., 4 (1933), 444-463.

The gains in habits of skill and knowledge which courses of study set up as educational goals may now be determined with considerable accuracy. These habits have little relation to the non-scholastic environment of the child and their measurement is relatively easy. That is to say, in finding how much a fifth-grade child knows about reducing fractions to lowest terms, we do not need to take into consideration such factors as race, sex, religion, or socio-economic status. The school plays such a predominant rôle in such skills that factors in the non-scholastic environment are relatively unimportant.

Again, a test of an arithmetical operation or spelling or grammatical ability renders its results in quantitative terms, so that, having scored our test, we are in a position to say that our child is at grade level 5.6 in arithmetic, or exceeds 80% of fifth-grade children in spelling, or simply that his raw score on such and such a test of grammar is 75. These results are then directly comparable with those of any other individual who has taken the same test.

Attitudes, however, are, in a sense, qualitative gains, and hence not to be disposed of so lightly. Nor can we say that the school plays the major rôle of environmental influence here. In fact there are strong indications, as we shall see later, that such is by no means the case.

Thus far we have not been able to determine so easily just what each individual's attitudes are at any given point in his development. We may quote the course of study and say glibly that in grade four the pupil should acquire an attitude of respect for the Arabs because we use their system of notation in counting. But some other influence, such as the behavior of an Arab who lives across the street, may cause him to lose his respect for the whole race, if he ever had it. Active dislike may result for all Arabs, or for anybody of a similar appearance or profession; or some other odd association may be formed. This *may* happen and it may not. We simply have no way of knowing. The greater part of the child's waking life is spent outside of the school.

The curriculum usually includes tests for knowledge habits

and skill, or, if it does not, they are not hard to work out, but the concomitant outcomes are either optimistically taken for granted or completely ignored.

Kelley's discussion on this point is interesting.[4] "The simple question," he says, "'What is the French word for horse?' will bring a true response from pupils, that is, those who know it respond correctly, and those who do not either fail to respond or respond incorrectly 100% of the time, while a question: 'How should a Democrat feel toward a Republican?' will bring a response characteristically unamenable to sound appraisal, for in addition to the subject's true attitude as it would be revealed by divine insight there are unmeasured differences in significance of the terms 'Democrat' and 'Republican' and there is a background of widely different intimacy of contact with these creatures. There are, of course, differences of contacts of pupils with horses and with written sentences referring to them, but such differences are commonly of a lower order than those that attach to emotional or attitude-arousing situations. . . . This situation creates a very interesting measurement problem, that of ascertaining when these . . . influences operate. We must measure something not a classroom product, something developed by specific experience that we know not of, but something characterizing an individual's response to cues which we can provide. I can ask a boy of five: 'Would you rather play with a little Irish boy or with a pickaninny?' and I can ask the same boy when an adolescent: 'Would you rather have an Irish boy or a negro for a companion?' If the answers are different, something has happened meanwhile, of this I am certain, though of its specific nature totally ignorant."

To quote Caldwell:[5]

Since attitudes have so much to do in determining human behavior, it seems highly important to make a direct effort to develop desirable attitudes. There are persons who argue that direct teaching does not

[4] Kelley, T. L., Scientific Method, N. Y., Macmillan Co., 1932, 190 pp., p. 104 ff. By permission of the Macmillan Co., publishers.

[5] Caldwell, O. W., Science—Truth or Propaganda, Sch. Sci. & Math., 33 (1933), 26-33.

produce attitudes but that the desired attitudes will result as by-products from the teaching of facts and principles . . . like the footless claims made forty years ago when the 'Committee of Ten' told us that exact science studies would make human beings scientific in their attitudes. It seems surprising that the 31st Yearbook of the National Society for the Study of Education, 1932, still claims that attitudes are by-products of teaching. . . . Attitudes are now thought to be as specific as other objectives and like others they must be directly sought by specific efforts if they are to be developed. . . . It is very much easier to teach facts and principles, which we all agree should be taught, than it is to teach helpful attitudes and to correct false attitudes.

Attitudes are concededly of great importance, then, in the scholastic scheme of things, and not only there, for as Charters [6] says, " no social enterprise can succeed unless the community attitude is favorable." He refers to motion pictures as one of a number of powerful factors operating upon attitudes and ideals of children. Are the schools one of these factors? Some work has been done attempting to answer this question.

II

Green [7] found national and racial prejudices already fixed in Welsh children seven years of age! In a test offering the opportunity to indict or to refrain from indicting, a people, he secured over 36,000 statements from children ranging from seven to sixteen years of age. The only difference between the seven year olds and the sixteen year olds was that the latter were more ingenious in defending their prejudices. The sources of the prejudices were found to be schools, newspapers, books, homes, experience, religious institutions, and the cinema. Books were rated at 50% of the sources, religious influences made up 1%, and the rest about 10% each. Green concludes that there is no reason to believe that the prejudices would not persist throughout life. The beginnings of the prejudices were not accurately determined as they were definitely fixed at age seven, and there was no reliable means of measuring them below that age.

[6] Charters, W. W., Developing the Attitudes of Children, Education, 53 (1933), 353-357.

[7] Green, G. H., Have Children a National Bias? Discovery, 13 (1932), 44-46.

Clearly this study finds the influence of the school on attitudes very slight. Books apparently play a large part, yet surely books are not very influential before the age of seven, at which point the attitudes are apparently already set. Again, the relation of the school to the books may be quite important.

As mentioned above, the movies have been found to exert a marked influence on attitudes. The work of Thurstone and others is important in this connection. Thurstone[8] reports a measurable influence on children's attitudes toward gambling by the picture "Street of Chance" which is to some extent an indictment of the vice. The children became severer in their attitudes toward gambling after seeing the picture, as indicated by their relative rating of gambling among twenty paired sets of items. The picture "Hide Out" had no influence on the attitudes of the children toward prohibition, as measured by a scale of 28 opinions on prohibition.

Peterson and Thurstone[9] in another of this series of studies,* found the film "Four Sons" exerting a marked effect on children's attitudes toward the German people. These attitudes were measured by both techniques—a paired comparison scale value and an opinion scale value. The shift in favor of the Germans was statistically significant in both cases. The influence of the same film on attitudes toward war was not so marked. Measured by an opinion scale, the shift was in the direction of pacifism but was not significantly greater than its P.E. Some work on the duration of the shift is being done and apparently the results are definitely lasting. This would be important for those concerned with comparing the cinema with the school in its influence on attitudes. Green's study[10] quoted above would seem to conclude that the two are approximately equal in influence.

[8] Thurstone, L. L., Motion Pictures and Children's Attitudes, J. Abn. & Soc. Psychol., 2 (1931), 291-305.

[9] Peterson, R. C., and Thurstone, L. L., Effect of a Motion Picture Film on Children's Attitudes Towards Germans, J. Ed. Psychol., 23 (1932), 4, 241-246.

* References 8 and 9 are included in the Payne Fund Studies (see bibliography).

[10] Green, G. H., *op. cit.*

Other films have been used with similar results, some being even more potent in changing attitudes. "The Birth of a Nation" for example, produced a 20% change. All the pictures except one produced results in the expected direction, and that one was suggested but insignificant. Two or more pictures on the same subject and presenting the same attitude have cumulative effects.[11]

As Charters [12] says, reviewing the work, "our attitudes are powerful determinants of our actions." The government's adoption of all sorts of publicity and propaganda reveals recognition of this fact. Motion pictures are such a powerful factor operating on the attitudes and ideals of children, that "to disregard the quality of commercial motion pictures is both reckless and dumb."

A study less scientific in character but with some interesting implications was made by the Women's Education Club of U. C. L. A.[13] A questionnaire was administered to 800 children in and near Los Angeles covering social situation, education value, taste in pictures and preference in actors. Of children studied previously at Chicago University, 90.6% were found to attend movies, with the highest frequency among delinquents and boys going more than girls. This study confirms those findings in general, reporting that since the movies' appeal is emotional rather than intellectual, it is stronger for inferior children. Sex differences were found to be minor at the elementary school level. Religious objections were the most important single factor in non-attendance.

A study by Vincent [14] might have some slight connection with this problem. He found the attitudes of 200 playgoing adults were related to models of conduct offered by the hero or heroine of the dramas which they attended. This might lead to some valuable experimentation in an effort to discover the rôle of the school in this well-known type of identification.

[11] Charters, W. W., *op. cit.*
[12] *Ibid.*
[13] Women's Education Club of U. C. L. A., The Child's Reaction to the Movies, Pi Lambda Theta J., 10 (1931), 4, 11-19.
[14] Vincent, M. J., Influence of Drama Upon Human Attitudes, Sociol. & Soc. Res., 17 (1932), 142-152.

Hartshorne, May, et. al.[15] report numerous factors involved in certain characteristic attitudes of children, among which the attitudes of friends in the same class appear to be of great importance; suggestibility is related, as are sibling behavior and socio-economic status. The intercorrelations of large traits, such as honesty, service, etc., are not high.

Lund[16] on the basis of a 20-fold scale of responses to a series of propositions found the correlation between belief and evidence to be .42, while that between belief and desire was .81. Belief determinants were listed as follows: public opinion, personal reasoning, desire and satisfyingness, teaching and training, axiomatic principles, personal opinion, and authoritative opinion.

Reinhardt[17] used the social distance scale and technique worked out by Bogardus,* and found northern students more prejudiced against the negro than southern students. Both northern and southern students excluded Turks, Negroes, Chinese, and Hindus from their families.

Rice[18] found stereotyped emotions predominating in attitudes, as his subjects judged photographs from newspapers with consistent inaccuracy. He suggests that emotional habits of responding enter into judgments of character and social status of individuals.

Willoughby[19] found marked sex differences on most social issues among college students. He found men's religious

[15] Hartshorne, H., May, M., Maller, J. B., and Shuttleworth, F., Studies in Deceit, 720 pp.; Studies in Service and Self Control, 560 pp.; Studies in the Organization of Character, 503 pp.; N. Y., Macmillan Co., 1928-30.

[16] Lund, F. H., The Psychology of Belief, J. Abn. & Soc. Psychol., 20 (1925-6), 63-81, 174-195.

[17] Reinhardt, J. M., Students and Race Feeling, Survey, 61 (1928), 239-240.

* A sevenfold rating scale on which the subject may place occupations, races, or peoples in positions of increasing intimacy, ranging from exclusion from the country to membership in the family. Bogardus, E. S., Social Distance and Its Origins, J. Appl. Sociol., 9 (1925), 216-226.

[18] Rice, S. A., Stereotypes: A Source of Error in Judging Human Character, J. Personnel Res., 5 (1926-27), 267-276.

[19] Willoughby, R. R., A Sampling of Student Opinion, J. Soc. Psychol., 1 (1930), 1, 164-169.

views, for example, more affected than women's by academic influence. This study will be referred to later.

Lundberg [20] found a quantitative analysis of an environment definitely related to the attitudes of groups in the environment. The radical, he concludes, is likely to be socially and economically insecure, in such condition as to have little to lose and much to gain by a change.

Allport [21] found from a study of political preferences, information, prejudices, and convictions of 375 undergraduates that definite types exist. Radicalism appeared to be associated with high scholarship and low prejudice, while conservatism was related to low scholarship and high prejudice. Differing from one's father in voting, feeling strongly on political matters, being a Catholic or being a Jew were all related to distinctive political and personal qualities.

Allport and Hartman [22] on a scale constructed about seven issues of current political interest found no general atypicality; students who were atypical might be conservative in some things and radical in others. However, it was found that reactionaries were more tough-minded, mechanistic, self-reliant and self-sufficient, more decided and more pronounced in their attitudes, while radicals were more tender-minded, more religious, more aware of their inner motives and conflicts, less self-assertive, more touchy in personal matters, more moralistic and meliorative, and more sensitive to the opinions of others.

Kolstad [23] used 75 statements of opinions on international problems to measure favorable and unfavorable attitudes toward internationalism using 500 Teachers College students for whom other data were available, as subjects. He found

[20] Lundberg, G. A., The Demographic and Economic Basis of Political Radicalism and Conservatism, Am. J. Sociol., 32 (1927), 5, 719-732.

[21] Allport, G. W., Composition of Political Attitudes, Am. J. Sociol., 35 (1929), 220-238.

[22] Allport, F. H., and Hartman, D. A., The Measurement and Motivation of Atypical Opinion in Certain Groups, Am. Pol. Sci. Rev., 19 (1925), 4, 735-760.

[23] Kolstad, A., A Study of Opinions on Some International Problems, N. Y., Teachers College Bureau of Publications, 1933 (T. C. Contribution No. 555).

no marked relationship between opinion scores and mental ability ($r. = .331 \pm .026$) but students of high intelligence tended to react more favorably than those with low intelligence ratings. He found small sex differences. Students majoring in Administration and History were consistently more internationally minded, and those majoring in Household Arts and Nursing Education were consistently less internationally minded, than the rest of the students. There is a variable factor here, however: the amount of college training. This, as measured by possession of degrees, was parallel to favorableness toward internationalism. Students from private non-sectarian institutions were more favorable toward internationalism, and those from publicly controlled colleges and universities were least favorable. No differences were found between students who had traveled abroad and those who had not. Students whose parents and grandparents were all foreign born tended to express more unfavorable opinions than those with American born ancestry, but no consistent relationship between nativity or residence in the various sections of the United States and opinion were found. Congregationalists were more internationally minded and Lutherans were less. A sixfold scale was used, offering subjects opportunity for expressing degree of certainty, or pleading ignorance of the items concerned.

Shales [24] presented 20 questions designed to permit intelligent, but different, answers on the basis of either city or country experience, to children in grades four to eight, and found distinct differences in the mind-sets. He found rural children becoming more rural minded up to the age of twelve, less so for two years, and then more and more so. City children became steadily more city minded throughout. He concludes that teaching should be based upon this characteristic difference in experience.

Shuttleworth [25] found that early strong religious home

[24] Shales, J. M., A Study of Mindset in Rural and City Children, J. Ed. Psychol., 21 (1930), 246-258.

[25] Shuttleworth, F. K., Influence of Early Religious Home Training on College Sophomore Men, Rel. Ed., 22 (1927), 57-60.

training carried over into present religious attitudes, beliefs, and experiences of college students. The correlation, based on a test in which students rated themselves along a scale between two extremes in a series of items, was .208. The carry-over into present religious activities was more marked, as indicated by a correlation of .436. The relation between religious home training and 1) cheating, 2) moral judgment, was insignificant.

Neumann [26] found that international attitudes of high school students, as expressed by an indicator with a five-fold scale of responses, were not dependent even primarily upon information. The environment of the school was a strong factor in determining the attitudes of the students, being clearly significant even in schools teaching the same curriculum. For example, students of a school in a city where a famous military academy is located were emphatically more militaristic than those of a neighboring city. The pupils of the two schools, both located in the south, "agreed in disagreeing" with the attitudes of pupils in the north on other questions. More than half the students had "strong attitudes."

Racial ancestry was found by Guilford [27] to be the strongest determinant in racial evaluation, when he had 15 races rated by 1000 American university students. The paired comparison method was used and the races were rated upon the desirability of admitting them to citizenship. When racial ancestry was partialled out, little relationship was found between the racial environment of a group and its preferences.

Powers [28] found little relation between intelligence or personality and false beliefs (credulity) in college students. Indications are, he says, that both introversion and false beliefs seem to depend more on early training than on each other or on intelligence.

[26] Neumann, G. B., A Study of International Attitudes of High School Students, N. Y., Teachers College Bureau of Publications, 1926 (T. C. Contribution No. 239).

[27] Guilford, J. P., Racial Preferences of 1000 American University Students, J. Soc. Psychol., 2 (1931), 179-204.

[28] Powers, F. F., Influence of Intelligence and Personality Traits Upon False Beliefs, J. Soc. Psychol., 2 (1931), 490-493.

Moore [29] gave a series of tests of native traits to two groups, one markedly radical, the other markedly conservative. Their answers to a questionnaire showed them equal in intelligence and in emotional stability; radicals far superior in mirror-drawing accuracy, reaction time, resistance, and somewhat superior in mirror-drawing speed, decision, and free association. He concludes that there is some innate basis of difference between radicals and conservatives. Environment and education have a tremendous influence, but environmental differences may be underlaid in very significant ways by innate differences in type of neuro-muscular machinery.

Vetter [30] found that radicals were more apt to be men than women, poor than prosperous, older children of families, non-partisan, Jewish, and more intelligent than conservatives.

Lasker,[31] in an extremely interesting study which makes no pretense of scientific accuracy, concludes that instinct is a minor factor in the formation of race attitudes, and that learned behavior, influenced by public school teachers, Sunday school teachers, and parents, is largely responsible. He claims that modification may be brought about by teaching, at least in part, but emphasis must be on method rather than on content.

Lapière [32] asked the question in casual conversation with 675 people in England and France: "Would you let a good negro live at your home?" Responses were classified according to their demonstration of prejudice. 279 of 360 people questioned in France were without prejudice; 14 of 315 questioned in England were without prejudice. No explanation of the color antipathy, the author concludes, can be found in the biological origins—social factors must be the explanation.

[29] Moore, H. T., Innate Factors in Radicalism and Conservatism, J. Abn. & Soc. Psychol., 20 (1926), 234-244.

[30] Vetter, G. B., Study of Social and Political Opinions, J. Abn. & Soc. Psychol., 25 (1930), 26-39.

[31] Lasker, B., Race Attitudes in Children, N. Y., Henry Holt & Co., 1929, 394 pp.

[32] Lapière, R. T., Race Prejudice: France and England, Soc. Forces, 7 (1928), 102-111.

Davis [33] found that Russian children ranked occupational levels in the inverse order from the way they were ranked by American children. Assuming other factors constant, the governmental system would seem to be the determining factor with these occupational attitudes.

Watson [34] attempted to ascertain sources of attitudes among college students. Keeny had previously found that students attributed 21% to the school, 21% to reading, 13% to acquaintances, 13% to home, 7% to personal experiences, 5% to hearsay, 4% to speakers, 4% to drama and movies, and so on. Watson took 100 replies not previously tabulated, dealing primarily with the problem of war. These classify 20% as pre-existent, 17% coming from first-hand contacts, 13% group sentiment, 10% schools, 9% reading, 7% influence of others' attitudes, etc., down to 3% moving pictures. There appears to be quite a bit of overlapping among the classifications and for this reason the value of this report is perhaps open to question.

Lundberg [35] tried to approach the question of whether women as a class tend to have distinctly different opinions on questions of politics, economic, religion, and social questions in general. Of 220 university students who filled out questionnaires, the females were more conservative on questions not directly affecting their position as a sex. On social questions the female of the species was more radical than the male. There was little apparent tendency for radical or conservative attitudes to become generalized and to transfer into different fields. There was no difference in the personal characteristics of individual variants from the majority.

No definite knowledge as to the factors most instrumental in shaping attitudes has been furnished by any of these studies. It seems that heredity as well as many phases of environment are all concerned to some extent. No effort has

[33] Davis, J., Testing Social Attitudes of Children in the Government Schools of Russia, Am. J. Sociol., 32 (1927), 947-952.

[34] Watson, G. B., Does World-Mindedness Depend Upon Goodwill or Information, Upon Character or Intelligence, Rel. Ed., 21 (1926), 188-194.

[35] Lundberg, G. A., Sex Differences on Social Questions, Sch. & Soc., 23 (1926), 595-600.

been made to exhaust this field, most of the studies included having some relation to the principal question at issue. It should, however, be of interest to note that upwards of a score of studies of a more or less experimental character differ so markedly in the factor or factors to which they attribute the formation of attitudes. It seems safe to assume that the inclusion of additional studies in the same field whose bearing on this work is not so clear would simply have increased the number of such factors. The studies reviewed cite among the factors of *importance*: motion pictures, books, newspapers, drama, religious training, school environment, general environment, friends, racial ancestry, early training, neuromuscular factors, sex, wealth, order of birth, race, intelligence, Sunday school teachers, attitudes of parents, social factors, government, scholarship, religious belief, hearsay, acquaintances, classmates, sibling behavior, suggestibility, observation, touchiness, tough-mindedness, self-assertiveness, belief, and last but perhaps not least, the school and the methods therein. The differences include the extent to which each factor is responsible and the importance of other factors. We refer the reader to the treatment of this topic in Murphy [36] for a valuable discussion which is beyond the scope of this paper. There are numerous other studies available relating to this problem, and some reviews and bibliographies will be mentioned later.

III

The school, then, is merely one of a number of environmental agencies which operate in shaping and changing attitudes. If Green's [37] findings are conclusive, it plays relatively a minor rôle. Lasker,[38] on the other hand, considers it most important. Some studies have been published attempting to discern just what is the influence of the school in modifying attitudes. Different experimenters, again, have found different answers.

[36] Murphy, G. B. and Murphy, L. B., Experimental Social Psychology, N. Y., Harpers, 1931, 709 pp., pp. 626-677.
[37] Green, G. H., *op. cit.*
[38] Lasker, B., *op. cit.*

Young [39] found that a sociology course in American race problems left the real opinions of students unchanged to a "monotonous" extent. This discovery was brought about by remarks overheard when students were off their guard. Checked by a questionnaire of opinions of the relative inborn ability of different races and nationalities, the races were ranked exactly as they had been before the course was begun. Had the remarks not been overheard, it would presumably have been taken for granted that the course was affecting the students' attitudes. The author concludes that a teaching method which is essentially a logical presentation of facts and theories in a short time is of doubtful efficacy, because racial opinions and biases have been formed over a period of years, beginning in childhood, by means which leave a more lasting impression than formal lectures and assignments.

Frederick [40] found that the social attitudes of high school students fall far short of the standards assumed by the professors. A lack of both information and social consciousness are exhibited in the answers to a series of true-false questions dealing with the intelligence of the students' patriotism, the extent of their racial prejudice, the range of their reading about foreign affairs, the amount of detailed information on foreign affairs and on work done to promote international peace and goodwill, and finally their general attitudes toward ideals of world peace, tolerance, generosity, or sympathy among nations, and opposing ideals of militarism, conquest, and aggression. Suggested causes for the decided lack of intelligent patriotism, as revealed for instance by 54% of the students' believing that the United States as a nation has never mistreated the people of any other race or nation, are pruned history texts and the unsympathetic study of foreign countries. The author concludes that there is a definite need for broadening the social consciousness of the coming generation, but he submits no program, nor does he state what is to be the source of this broadening.

[39] Young, D., Some Effects of a Course on American Race Problems on the Race Prejudice of 450 Undergraduates at the University of Pennsylvania, J. Abn. & Soc. Psychol., 22 (1927), 235-242.

[40] Frederick, R., Investigation into Some Social Attitudes of High School Pupils, Sch. & Soc., 25 (1927), 410-412.

Symonds[41] submitted a social attitudes questionnaire to boys and girls from grade eight through college. The questions, over 100 in number, were marked for liberalism or open-mindedness of viewpoint. Answers were usually favorable to practices now in operation. The most highly discriminative items were those dealing with government control and benevolence, religious and racial questions, those dealing with the treatment of criminals, taxation, and international relations. Other items producing marked differences of opinion were about private schools, marriage, tariff, local control of schools, industrial relations, alcohol, and censorship, but these latter were not discriminative between liberals and conservatives. Symonds draws the moral that attitudes are not necessarily created in school from mere information-giving instruction. He finds that children come to school with attitudes already formed on many social questions, and inquires why the higher schools make so little change in their attitudes.

Garrison and Mann[42] submitted a list of 25 statements on economic, civic, legal, religious, and social questions to 258 male college students. These were arranged on a scale indicating the possessor's degree of certainty that his opinions were correct. Although the freshmen showed more contradictions than the seniors, the average certainty of opinion appears to be little affected by college courses; there was a difference of only .1% between freshmen and seniors on total extreme ratings. The seniors were more liberal on religious questions than the freshmen, and also less uncertain about socio-economic questions, but no data is given to show the influence of college training on these responses.

Sinclair and Tolman[43] approached the problem from a somewhat different angle. They compared two groups of college students, one trained in science and mathematics, the

[41] Symonds, P. M., A Social Attitudes Questionnaire, J. Ed. Psychol., 16 (1925), 316-322.

[42] Garrison, K. C., and Mann, M., A Study of the Opinions of College Students, J. Soc. Psychol., 2 (1931), 168-178.

[43] Sinclair, J. H., and Tolman, R. S., An Attempt to Study the Effect of Scientific Training Upon Prejudice and Illogicality of Thought, J. Ed. Psychol., 24 (1923), 5, 362-370.

other trained in liberal arts. The inference-making test from Watson's "Survey of Public Opinion"[44] was the principal criterion of difference, although the entire test was given. A positive correlation was found between inference-making and intelligence, as also between intelligence and percentage of prejudice. The conclusion is that training in science and mathematics appears not to be a potent factor in differentiating the members of the two groups in inference-making ability. No evidence was found of "transfer" of logicality or reasonable habits of thought from fields of special scientific training to fields involving economic, ethical, or social judgment, as measured by the Watson test. Results show a correlation between scientific vocation and ability to draw correct inferences, but this is not to be ascribed to scientific training itself. The pursuit of science appears to attract a group superior in this respect.

Kornhauser[45] makes the point that "college courses presumably affect students' attitudes as well as their fund of knowledge. It might be difficult to say which change is more important, especially in the field of the social sciences." The changes in economic attitudes or opinions brought about by a year's survey course were measured by a five-fold scale test given at the beginning and at the end of the course. At the same time the knowledge of the students was also tested. In this field a significant improvement occurred for each quarter and for the year as a whole. Individual differences were not related to intellectual ability and were inversely related to initial economic knowledge. In attitudes, fairly extensive and significant changes occurred, clearly related to content and points of emphasis in the course. The changes were in the direction of less uniformity, less undecidedness, more liberalism, less extremeness, and more liking of scientific procedure. Changes were slight, however, as compared with changes in knowledge, so that one conclusion of this study is the small

[44] Watson, G. B., The Measurement of Fair-Mindedness, N. Y., Teachers College Bureau of Publications, 1925 (T. C. Contribution No. 176).

[45] Kornhauser, A. W., Changes in Information and Attitudes of Students in an Economics Course, J. Ed. Res., 22 (1930), 288-298.

influence of the course on attitudes. Many items show little or no change.

Harper [46] in a test of a large group of American educators, found them extremely conservative, easily influenced, and unscientific in their attitudes. The scores were not related to age, sex, church, or political affiliation. Extension of their education caused a median gain of less than four intervals a year, while a particular course in thought-provoking discussion moved the median up 14.4 intervals in a year. A change in reaction patterns with a wide transfer of application was evidently the outcome of this course. Elementary and secondary education are accomplishing practically nothing toward changing the situation. Harper recommends changes in American education in the direction of 1) social problems of genuine concern to the participants, and 2) emphasis on critical thought rather than uncritical acceptance of proposed solutions.

Jones,[47] using a five-fold scale to measure social attitudes, found the only marked differences between seniors and freshmen to be that the seniors were more conservative on economic questions and far more liberal on religious questions. He found also low correlations between intelligence and degree of certainty, and between intelligence and radicalism. No correlation was as high as .20.

The work of Biddle [48] differs considerably from the majority of those mentioned in that he deliberately set out to teach a unit not ordinarily included in the school curriculum; a unit moreover whose outcome must be exclusively sought in the realm of attitudes. He gave an opinion test to a total of 350 subjects, mostly high school students, divided into six groups, after which the students read a series of pamphlets explaining the technique of propaganda. They were then

[46] Harper, M. H., Social Beliefs and Attitudes of American Educators, N. Y., Teachers College Bureau of Publications, 1927 (T. C. Contribution No. 294).

[47] Jones, E. S., Opinions of College Students, J. Appl. Psychol., 10 (1926), 427-436.

[48] Biddle, W. W., Propaganda and Education, N. Y., Teachers College Bureau of Publications, 1932 (T. C. Contribution No. 531).

tested again on attitudes, and were given to understand that the experiment was over. There followed a test of gullibility on subject matter within the field of Pacific relations of the United States, no connection between this and the propaganda material being made, unless the students themselves made the transfer. Nine lessons on propaganda were then given the experimental group. In so far as the test used was a real measure of gullibility, the teaching definitely succeeded in reducing the response to emotional propaganda in 42% of the experimental cases. The experimental students gained 17.5 S.D. diff. over the controls on nationalistic material and 37.1 S.D. diff. on internationalistic material. The author then tried to discover the transfer value from a literary to a verbal stimulus, going into one of the experimental schools, being unknown to the students, and being introduced as a speaker on current events. He delivered a speech, utilizing a series of propaganda devices for creating ill-will toward a foreign nation. One experimental student remarked that this was propaganda. Twenty-four others, of whom 18 were experimentals, disagreed with the speaker; twelve, of whom nine were experimentals, enthusiastically agreed. Of these latter nine, seven had failed to improve during the course of the experiment. A large number of the students made no reference at all to the speech. The writer had hoped that some would mention propaganda devices specifically, but none did. A speech situation is, of course, different from a reading situation. Biddle concludes by stating that he has no illusions as to the probable fate of such learning as these lessons provide. Should a war be declared, "immediately and unjustly by the country to which these students belong, they would doubtless drop into line and support the war. We cannot expect one or two weeks of teaching to set a permanent counter-tendency to years of previous teaching."

Chen's work[49] checks up on several phases of Biddle's. He found that every group of college students subjected to propaganda, whether pro-Japanese or pro-Chinese, shifted in

[49] Chen, W. K-C., The Influence of Oral Propaganda Material Upon Students' Attitudes, Arch. Psychol., 1933, 150.

the direction in which the propaganda impelled. Changes were due to the propaganda itself, and not to the personalities of the instructors, who were shifted during the experiment. "A few minutes of vigorous propaganda given orally in the classroom," says Chen, "may under these conditions produce large and measurable results." He found that propaganda affected all subjects, from those of similar to those of opposite attitude, the size of the effect not being related to the original attitude. Propaganda seems to have a generalized effect on related statements, but there was no immediate transfer from propaganda about art to international attitudes. Neutral propaganda also was effective, groups originally pro-Chinese shifting to a more neutral viewpoint. Definite attitudes were quite common, despite absence of definite information about Manchuria. Emotional appeal was quite as influential with this supposedly critical group of college students as was logical presentation of facts. The technique of measurement was a five-fold scale indicating degree of certainty. The test appeared to be both reliable and valid, although there were but 20 statements in all, ten pro-Chinese, and ten pro-Japanese.

Droba [50] tested 30 college students at the beginning and at the end of a course on the negro to see whether there had been any appreciable change of attitude. The result was found to be slightly more favorable attitudes toward the negro, with increased variability of response. Students, in a similar experiment, appeared to become more favorably inclined as they ascended the educational scale, again with variability increasing.

Schlorff [51] designed a scale measuring the nationality attitudes of a group of high school pupils. A special curriculum was then set up, designed to modify the attitudes selected for experimentation. The experimental group was then remea-

[50] Droba, D. D., Education and Negro Attitudes, Sociol. & Soc. Res., 17 (1932), 137-141.

[51] Schlorff, P. W., An Experiment in the Measurement and Modification of Racial Attitudes in School Children, N. Y. U. unpublished doctor's dissertation, 1930 (abstract in U. S. Government Bulletin, 1932, p. 66).

sured against the scale to determine the extent of the change. There was apparently no control group. The author concludes that the resources of the public school may be effectively employed in the modification of social attitudes, through the use of certain curricular material, properly designed and applied.

Willoughby [52] found marked sex differences on most social issues among college students, as mentioned above. He also found a noticeable trend toward liberalism on these issues, with increased exposure to academic influences. Although no experiment is involved, the evidence indicates that a generalized influence on attitudes is produced by college.

Meltzer [53] used the personal interview technique to determine the extent of children's understanding of important social concepts, selected from such periodicals as the *New Republic* and *Outlook,* and from such books as Wallas' *Great Society.* The number of concepts understood progressed steadily upwards from grade five to grade twelve. Correlation of grasp of these concepts with mental age was .58, with C.A. .55, with occupational status, .36, with grade .69, with E.A. .80. In four groups which were comparable in all other factors, those children who used Social Science Pamphlets showed clear superiority in grasp of concepts over those who did not use the pamphlets. The influence of this curricular cleavage is more clearly brought out by the fact that the mean of the eighth grade pupils who used the pamphlets was higher than that of the twelfth grade pupils not using them.

Haag [54] administered the Bogardus Test of Social Distance and the Watson Test of Fair-mindedness, mentioned above,* to 23 high school seniors and 75 university students. The children in the lower grades appeared to show less clearly defined race attitudes than the older children. The high school pupils revealed more acceptable attitudes toward Indians than toward Negroes. Older students were more inclined to ex-

[52] Willoughby, R. R., *op. cit.*

[53] Meltzer, H., Children's Social Concepts, N. Y., Teachers College Bureau of Publications, 1925 (T. C. Contribution No. 192).

[54] Haag, H. L., Study of Racial Attitudes of High School and University Students, Master's Thesis, U. of Mich., Ann Arbor, 1930 (abstract in U. S. Government Bulletin, 1931, No. 13).

* See footnote, p. 7 and reference 44, p. 16.

press extreme types of attitude on the Watson test, although their attitudes appeared to be more liberal. There was no sex difference of any significance. The rôle of the school is not clearly brought out in this study.

Clark [55] used the same Watson Test and came to the conclusion that children tend to become less prejudiced as they advance in their education. He found less variation in prejudice among students working together in the same classroom and toward the same general objective. There is evidently some environmental influence here. Night school students in a narrow trade course were also more prejudiced than other groups of the same age and education.

Dudycha [56] found that college instruction, although it did convert some students from their naïve beliefs and superstitions, was by no means such as to convince all students. The difficulty appears to be that too much transfer is expected, general scientific principles being taught and the students being expected to translate them into their own lives and thought, and to modify their beliefs accordingly. As revealed by a comparison of the number of statements believed by seniors with the number believed by freshmen, we cannot be sure that college students will necessarily make this transfer.

Garrett and Fisher [57] found no relation between intelligence and credulity on their test of 40 items of popular misconceptions. The largest factor in superstition is reported to be lack of adequate information. The probable source, the authors conclude, is childhood. The test was used with high school seniors. The adequate information, presumably, will have to be acquired in college. Uncritical acceptance and high emotional values are listed as factors likely to cause the retention of these beliefs throughout elementary and high school. The rôle of the school is not clear.

[55] Clark, E. L., Study of Fairmindedness in Oregon Institute of Technology, 1930 (unpublished; abstract in U. S. Government Bulletin, 1931, No. 13).

[56] Dudycha, G. J., Superstitious Beliefs of College Students, J. Abn. & Soc. Psychol., 27 (1933), 457-464.

[57] Garrett, H. E., and Fisher, T. R., The Prevalence of Certain Popular Misconceptions, J. Appl. Psychol., 10 (1926), 411-420.

Rural people are more superstitious than urban ones, Lundeen and Caldwell [58] report.* These authors conclude that agencies, including education, which influence people, have not prevented or removed superstitions. Education and experience (we cannot determine the extent of each) do reduce such belief, college students showing less than high school seniors, although the former have heard of more misconceptions. These authors also find girls more superstitious than boys.

Whitelaw and Laslett [59] found the same sex differences as Lundeen and Caldwell in their work with college students. They also report that education apparently does not remove the acceptance of certain misbeliefs or superstitions as true. Three main causes for this retention are offered: removal of vague fears, increase of advantage over others, and self-justification for relative failures.

Maller and Lundeen [60] sum up some preceding studies along this line in an excellent bibliography. Their study also attempted to get at sources, the subjects, senior and junior high school pupils, indicating for each item whether they had been taught the idea by home, school, church, friends, books, newspapers, or their own observations. The findings were: 1) a negative correlation between age and number of superstitions, 2) a statistically significant sex difference, in the same direction as the studies previously cited [61] had pointed. As for the sources, friends fostered most superstitions and the home the next largest amount. In correcting superstitions, observation was the most effective source. Educational sources (books, school, newspapers, and church) had a tend-

[58] Lundeen, G. E., and Caldwell, O. W., Study of Unfounded Beliefs Among High School Seniors, J. Ed. Res., 22 (1930), 257-273.

* Also included in "An Experimental Study of Superstitions and Other Unfounded Beliefs, as Related to Certain Units of General Science." See bibliography.

[59] Whitelaw, H., and Laslett, H. R., A Further Study of the Acceptance of Popular Misbeliefs Among College Students, Kadelpian Rev., 11 (1932), 297-300.

[60] Maller, J. B., and Lundeen, G. E., Sources of Superstitious Beliefs, J. Ed. Res., 26 (1933), 321-343.

[61] Lundeen, G. E., and Caldwell, O. W., *op. cit.*; Whitelaw, H., and Laslett, H. R., *op. cit.*

ency to correct superstitions, but many reported them as fostering these beliefs. The authors conclude that the effectiveness of each of the sources depends upon the total background of the individual; the same source may be fostering superstitions in one individual and correcting them in another.

Gilliland,[62] besides finding a negative correlation between scholarship and superstitions, determined that one course in psychology significantly reduced the number of common beliefs held by college students.

Caldwell and Lundeen[63] report another experiment in their series on unfounded beliefs that might be included here. A unit of instruction regarding unfounded beliefs was added to the topic of heredity, one regularly included in the high school biology course. The gains of the students in the unfounded-belief material was compared with the gain in factual knowledge, and although both were considerable, in every class but one of seven the gain in the unfounded beliefs exceeded the gain in facts. The authors conclude that the knowledge foundation for desirable attitudes concerning certain facts may be developed by remedial instruction.

Downing[64] devised a test of some of the elements and safeguards of scientific thinking and administered it to 2,500 pupils of grades eight to twelve. Although a gradual and uniform increase in the percentage of correct answers is shown from grade to grade, there was no evidence that this was due to increase in the amount of science taught. Matching pairs with the same intelligence but differing amounts of science was not feasible, but in one school the comparison of students who had taken varying amounts of science showed no reason for believing that the study of scientific subjects gives skill in scientific thinking among high school pupils.

[62] Gilliland, A. R., A Study of the Superstitions of College Students, J. Abn. & Soc. Psychol., 24 (1930), 472-479.

[63] Caldwell, O. W. and Lundeen, G. E., Changing Unfounded Beliefs—A Unit in Biology, Sch. Sci. & Math., 33 (1933), 394-413. (Cf. note immediately following footnote, p. 58.

[64] Downing, E. R., Does Science Teach Scientific Thinking?, Science Ed., 17 (1933), 2, 87-89.

Strauss [65] administered two tests on some elements of scientific thinking to 1,800 high school and 165 college students. He reports that certain elements of scientific thinking are better mastered than others; no sex differences in ability to use these elements being found. Less than half the students improved in this ability in progressing from grade eight to grade sixteen. C.A. rise does not bring about improvement in scientific thinking, but there is a low positive correlation between I. Q. and scientific thinking.

Hurd [66] collected concepts of an appreciational nature to be used as specific objectives in high school science. The 64 items of a longer list which received 80% agreement among members of a physics club and Teachers College graduate students in science were made into a true-false test and given to 760 science pupils in a high school. Four months later, after some attention had been given to the items in class, another form of the same test, having a correlation of .70 with the first form, was given. Significant gains were shown on the mean scores. The preliminary scores indicated that some of these concepts were formed without specific instruction. Advanced classes showed higher scores than the lower classes, probably due to higher intelligence, higher C.A., and more work in science. There was no control group.

Moore [67] concluded from a study of the relation of the scientific attitude to factual knowledge that the phase of scientific attitude enabling one to distinguish the most valid explanation for a given situation in daily life is clearly related to a knowledge of scientific facts and principles. The ability to apply knowledge is not in direct proportion to knowledge of facts, however, nor is any person able to supply all the facts he knows. The subjects used in this experiment ranged from eighth grade pupils to high school teachers. The

[65] Strauss, S., Some Results From Tests of Scientific Thinking, Master's Thesis, U. of Chicago, 1931 (unpublished; abstract in U. S. Government Bulletin, 1932, p. 54).

[66] Hurd, A. W., Appreciational Objectives in Science Teaching, Sch. & Soc., 37 (1933), 124-126.

[67] Moore, E. B., A Study of Scientific Attitudes as Related to Factual Knowledge, Sch. Rev., 38 (1930), 379-386.

five-fold technique was used with alternative explanations of a given situation, while simple true-false statements were given for the facts corresponding to the situations in the other part of the test. The elementary school teachers were best of all the groups involved in the relation between their ability to choose the correct item to explain a situation and their knowledge of facts. There were no significant sex differences, but superior intelligence, general educational training, and experience appeared to increase the knowledge of facts and the ability to apply it.

Weller [68] concluded from a study of the attitudes and skills of a group of sixth grade elementary school pupils, that elementary science with proper guidance provides an opportunity to grow in other ways than in the accumulating of factual material. She gave tests of attitude, technique of observation, and knowledge, before and after two units of the science course of study. Of 30 matched pairs, equated on I.Q., M.A., C.A., and Rd.A., the experimental group significantly surpassed the control group on two tests of attitudes and two tests of technique. On one knowledge test the experimental group was 2.2 S.D. better than the control, and on the other the control group was significantly superior. The experimental factor was attention to the modification of attitudes and techniques on the part of the teacher; both teachers and pupils were conscious of an effort in that direction. Of the whole population (not matched) 180 complete records were scored, and in this comparison, the experimental group was significantly superior in all three elements. The groups were not matched for initial score; gains are not compared except in percentages. The correlation of I.Q. with attitude score was .24.

Entire college courses have been revealed as making slight changes or no changes at all in the attitudes of those exposed to them. A very different result was reached by Willey and Rice [69] who measured the attitudes of a group of college

[68] Weller, F., Attitudes and Skills in Elementary Science, Science Ed., 17 (1933), 90-97.

[69] Willey, M. and Rice, S. A., William Jennings Bryan As a Social Force, J. Soc. Forces, 2 (1924), 338-344.

students on the subject of evolution after a lecture on the subject by Mr. William Jennings Bryan. The students were tested after the lecture and also reported what their attitudes had been before. A comparison revealed a significant change in the direction of fundamentalism, which, the reader may recall, was decidedly the point of view upheld by the speaker. A few students, however, reacted antagonistically to the speech, and reported themselves as more hostile to the Bryan point of view than they had been before.

The accompanying table I presents in summary form the findings of the studies reported above, bearing on the three principle fields of attitude measurement with which this study is concerned: social attitudes, superstitions, and scientific attitudes.* There is, naturally, considerable overlapping in these classifications, but the grouping has been adhered to as closely as possible. In each group, first are listed the studies which show education producing no change, and then follow those that reveal significant changes produced by education.

TABLE I

SUMMARY OF STUDIES DEALING WITH THE INFLUENCE OF EDUCATION ON CERTAIN ATTITUDES

Author	Reference	Population	Attitudes Involved	Conclusions
Green	7	Age 7-16	Racial, National	Older children have same prejudices as younger
Young	39	Coll. students	Racial	No change after course in Sociology
Frederick	40	H. S. students	Racial, National	Inferior attitudes found
Symonds	41	Grade 8 thru college	Social	Higher schools make little change
Garrison-Mann	42	Male coll. students	Social, Religious	College courses affect certainty of opinion very little
Sinclair-Tolman	43	Coll. students	Social, Religious	Training in science and math. does not improve unprejudiced inference-making
Kornhauser	45	Coll. students	Social, Economic	Change in attitude slight compared with gain in knowledge
Harper	46	American educators	Social	Elementary, secondary education make no changes; group discussions do

* Studies of honesty, coöperativeness, etc. are not considered as bearing on our field; they are traits rather than social attitudes.

Author	Reference	Population	Attitudes Involved	Conclusions
Jones	47	Coll. students	Social	College appears to influence both ways
Biddle	48	H. S. students	Racial, National, Social	Significant change effected by lessons in propaganda
Chen	49	Coll. students	Racial, National	Propaganda effected change in all students
Droba	50	Coll. students	Racial	College course effects change
Schlorff	51	H. S. students	National	Public school effects change
Meltzer	52	Grades 8-12	Social	Use of Social Science Pamphlets gives superior grasp of concepts
Willoughby	19	Coll. students	Social	College produces change
Kolstad	23	Coll. grad. students	National, Social	College training makes for internationalism
Haag	54	H. S. seniors, coll. students	Social, Racial	Race attitudes are clearer cut in older children
Clark	55	H. S. students	Social	Children become less prejudiced as they advance in education
Dudycha	56	Coll. students	Common beliefs (superstitions)	Few students converted from naïve beliefs by college instruction
Garrett-Fisher	57	H. S. students	Common beliefs	Beliefs retained from early childhood
Lundeen-Caldwell	58	H. S. seniors, coll. students	Common beliefs	Education neither prevented nor removed superstitions
Whitelaw-Laslett	59	Coll. students	Common beliefs	Education apparently does not remove superstitions
Maller-Lundeen	60	Jr. & Sr. H. S. students	Common beliefs	Education tends to correct, but sometimes fosters, superstitions
Gilliland	62	Coll. students	Common beliefs	One course in psychology reduced superstitions markedly
Caldwell-Lundeen	63	H. S. students	Superstitions, scientific attitude	Instruction develops desirable attitudes
Downing	64	Grades 8-12	Scientific	No evidence that improvement is due to the school
Strauss	65	H. S., coll. students	Scientific	Less than half the students improved from grade 8 to college
Hurd	66	H. S. students	Scientific	Science course causes gain
Moore	67	Grade 8 students to H. S. teachers	Scientific	Education improves both knowledge and application of facts
Weller	68	Grade 6 students	Scientific	Education affects favorably both attitudes and techniques
Willey-Rice	69	Coll. students	Scientific	One speech makes significant changes

This table sums up 31 studies dealing with the three types of attitudes with which we are concerned. Some of the conclusions are based upon careful experiments, while others are not so well founded. In very few studies are experimental factors, populations, length or intensity of the experimental period, criteria of difference, or instruments of measurement, directly comparable.

Of these studies, fourteen say that instruction of one sort or another produces no significant, favorable change in attitudes; fourteen report that some kind of instruction does produce such a change; and three are questionable, i. e., the change operates both ways, or in an unexpected way.

Subdividing the studies into our three major classes, we find that in the social attitudes (including racial, national, and economic), eight find a change, eight do not, and two are hazy; in common beliefs, two find a change, four do not, and one is open; in scientific attitudes, five find a change and two do not. The last two classifications overlap considerably, and one study, which groups the two types together was included under both. If we combine common belief and scientific attitude studies, the score is six to six, exactly in the same proportion as the studies of social attitudes.

Analyzing the results by populations, we find that the studies using college students as subjects report a definite change occurring in six cases and no change in seven. In the studies involving high school students, the score is reversed, seven finding changes due to education, and six finding no such changes. Among junior high school pupils, two studies say yes, and three say no. Elementary school pupils change in one case and do not in the other. It seems to make little difference what the age of the group is.

Only a few of the experimenters definitely set up certain attitudes with which to operate, some adding them to the curriculum, and others selecting attitudes theoretically regarded as outcomes of the teaching of a unit or a course or a curriculum, and measuring the change. A few stressed a particular attitude in connection with a course. If such studies are uncontrolled they mean very little, since the gain

of a group subjected to the experimental procedure might have been equalled or even exceeded by another group comparable in all other respects.

Clearly this is an inviting field for further experimentation; a field in which there is almost no agreement or uniformity in the findings of previous studies reported. A single lecture or a moving picture show exerts a marked influence on the attitudes of its audience—and years of schooling, home training, college courses, effect no change at all! Children are discovered coming into the high schools with their attitudes fixed and immovable on a wide variety of subjects; some even say they have been set since the first grade, perhaps earlier still. Others find that elementary, secondary, or higher education, as the case may be, plays a part in the determination of attitudes, this part ranging from almost zero to almost 100%.

The primary reason for this discrepancy seems to be the variability in the techniques and instruments of measurement that are used. This may be traceable to the conflict of opinion as to the constitution of an attitude, and hence to reams of paper exhausted on definition that might have been better used to state the conditions of an experiment. Our bibliography includes a number of studies that involve merely classification of the phenomena or differentiation between attitude and opinion.

In addition to the studies included in table I, several others might be mentioned. These studies are not based on the three types of attitudes included in the table, but are concerned with attitudes of character, honesty, and citizenship. These studies are by Campbell and Koch,[70] Humke,[71] and Zyve.[72]

The former found that schools having an honor system were no more likely to have honest students than schools not

[70] Campbell, W. G. and Koch, H. L., Student Honesty in a University With an Honor System, Sch. & Soc., 31 (1930), 232-240.

[71] Humke, H. L., An Experiment in Measuring Changes in Pupil Attitudes Affected by Teaching, Bull. of Sch. of Ed., Indiana Univ., 10 (1933), 5-11.

[72] Zyve, C., Experiments in The Teaching of Integrity, Teachers Coll. Rec., 32 (1931), 359-374.

having such a system. The second found that attitudes of citizenship were not affected by stress of such attitudes in connection with all subjects in grades five to eight. Other factors were not carefully equated, nor are the tests satisfactory to the authors for both reliability and validity. The latter found that in elementary schools generalized discussion of fair play did not decrease cheating in specific situations significantly more than it was decreased in a control group.

IV

Aside from studies referred to directly, we might add to our bibliography, for the sake of completeness and for the benefit of those interested in a survey of the field of recent work in character and personality, the following authorities: Watson [73] who includes all the important bibliographies up to 1931; Sherman [74] previously cited, who has some valuable criticisms of some methods and procedures that have been used; the Character Education Inquiry [75] also mentioned above, three volumes of outstanding new departures in a closely related field; the Murphys [76] and particularly chapters 10 and 11, which no student of character, personality, and attitude measurement can afford to miss, giving a variety of interesting approaches to these problems; Droba, who more recently,[77] along with Watson,[78] has taken up the problem from the point of view of the measuring instruments involved; May [79] who gives some good advice to the would-be experimenter; Katz and Allport [80] who offer interesting defi-

[73] Watson, G. B., Character Tests and Their Applications Through 1930, Rev. Ed. Res., 2 (1932), 185-270.
[74] Sherman, M., *op. cit.*
[75] Hartshorne, H., May, M., Maller, J. B., and Shuttleworth, F., *op. cit.*
[76] Murphy, G. B. and L. B., *op. cit.*
[77] Droba, D. D., Methods for Measuring Attitudes, Psychol. Bull., 39 (1932), 302-323.
[78] Watson, G. B., Character and Personality Tests, Psychol. Bull., 30 (1933), 467-487.
[79] May, M. A., Problems of Measuring Character and Personality, J. Soc. Psychol., 3 (1932), 131-145.
[80] Katz, D. and Allport, F. H., Students' Attitudes, Syracuse, Craftsman Press, 1931, 408 pp.

nitions of attitude and valuable descriptions of techniques; Symonds [81] who surveys several phases of the problem thoroughly and offers some things that are new as well; McDonough [82] which is somewhat older than the others mentioned, but is a careful, accurate piece of work; and finally, for those interested in the work beyond the borders of this country, there is Maller.[83]

It seems important to note that in all this work only one or two studies of an experimental nature went below the junior high school level, a surprising situation in view of the fact that there is fairly general agreement that children come into the seventh grade with a rather completely made up set of attitudes.

Another criticism that comes to mind is that in few of the studies cited were the attitudes involved actually determined by behavior, or in any case, checked by some means of verifying changes in behavior. Pencil-and-paper responses to test statements predominate, verbal responses are found occasionally. Very rare are studies like that of Voelker [84] or of Maller [85] or the Character Education Inquiry [86] which attempted to determine attitudes of various kinds (more closely related to character than any other field) by the behavior of the subjects in specific situations. Recent bibliographies indicate that such studies are increasing. The relation of the attitudes recorded on a questionnaire to the attitude as it functions in actual life situations may not be as clearcut as has been taken for granted.

As a matter of fact, the relation of pencil-and-paper be-

[81] Symonds, P. M., Diagnosing Personality and Conduct, N. Y., Century Co., 1931, 602 pp.

[82] McDonough, Sr. Mary Rosa. Empirical Study of Character, Catholic Univ. of America Stud. in Psychol. and Psychiatry, Baltimore, Williams & Wilkins Co., 2 (1929), nos. 3, 4.

[83] Maller, J. B., Studies in Character and Personality in German Psychological Literature, Psychol. Bull., 3 (1933), 209-232.

[84] Voelker, P. F., The Function of Ideals and Attitudes in Social Education, N. Y., Teachers College Bureau of Publications, 1921 (T. C. Contribution No. 112).

[85] Maller, J. B., Cooperation and Competition, N. Y., Teachers College Bureau of Publications, 1929 (T. C. Contribution No. 384).

[86] Hartshorne, H., May, M., Maller, J. B. and Shuttleworth, F., *op. cit.*

havior to actual conduct was found to be quite low by Sorokin.[87] He had sociology students contribute to three causes: 1) buying diagrams and calculating machines for their own departmental use, 2) to help three brilliant students whose families were impoverished by floods so that they were forced to leave college, 3) to help Chinese and Russian students suffering from famine . . . the money vote which was taken showed the amount and number of contributions were directly proportional to the nearness of the appeal. Later, in response to a true-false test item stating that we should be equally ready to help all, no matter where they may be, most of these same students marked the statement true.

Neumann,[88] on the other hand, found that test behavior agreed with overt conduct perfectly among 40 persons definitely identified with international movements to whom he administered his "indicator." The Character Education Inquiry[89] found a high relation between written responses and actual behavior in connection with habits of service among children. Watson[90] determined that his prejudice profiles based on responses to his test were valid by the criterion of judgment of the extent of individuals' prejudicedness.

Stauffer[91] found that both case studies of attitudes and results of a scale modeled after that of Thurstone were self-consistent in the measurement of favorableness of students toward prohibition laws and toward drinking liquor themselves. The correlation between the ratings of four judges on the case studies and the scale results, reduced to standard scores was .81, becoming .86 when corrected for attenuation. Other checks tended to strengthen this conclusion.

[87] Sorokin, P. A., Experimente Zur Soziologie, Zschf. f. Volkerpsychol u. Soziol., 4 (1928), 1-10.
[88] Neumann, G. B., *op. cit.*
[89] Hartshorne, H., May, M., Maller, J. B., and Shuttleworth, F., *op. cit.*
[90] Watson, G. B., *op. cit.*
[91] Stauffer, S. A., Experimental Comparison of Statistical and Case History Techniques of Attitude Research, Pub. Am. Sociol. Soc., 25 (1931), 154-156.

Bain [92] points out the impossibility of differentiating attitude from value. "The questionary," he says, "as well as life-history, personal interview and all written documents, are of little use in attitude research except as clues. The final test of an attitude is 'how do the persons behave?'"

Murphy [93] differs from this conclusion as this quotation will indicate: "After all a man's categorical agreement or disagreement with a strongly stated opinion about Chinese, Jews, or Communists, is in every day life regarded (if the man be sincere) as a *significant* part of his behavior. There seems to be no reason why this behavior should suddenly become *non-significant* when it is made the subject of careful inquiry."

Referring to the studies of Allport and of Hartshorne and May on the nature and interrelationship of personality traits, Curti [94] says: "Both of these studies . . . show that traits are not independent underlying entities which are either possessed or not possessed by the individual child. . . . The possession of a well-developed trait is never a guaranty of complete consistency of conduct along a given line."

While not specifically mentioning the types of social attitudes particularly considered here, this generalization may be quite as applicable to them, since social attitudes appear to be even less closely related to each other and to other factors of the individual personality than the traits of honesty and ascendance-submission to which the above quotation refers.

Discussions on methods of attitude research, some of which have been cited above, appear to differ quite as widely in their points of view as experimenters differ in their findings.

Cantril,[95] in discussing the more important definitions of an attitude, makes the point that all attempts at attitude measurement take general determining tendencies for granted

[92] Bain, R., An Attitude on Attitude Research, Am. J. Sociol., 33 (1928), 940-957.
[93] Murphy, G. B. and Murphy, L. B., *op. cit.*, p. 626.
[94] Curti, M. W., Child Psychology, N. Y., Longmans, Green, & Co., 1930, 527 pp., p. 468 ff.
[95] Cantril, H., General and Specific Attitudes, Psychol. Monog., 42 (1932), 192, 109 pp.

and assume that these manifest themselves consistently in specific instances. He feels that a general attitude seems to serve as a dynamic or directive, or at least, a determinative influence upon more specific attitudes and reactions. He found a positive correlation between the individual's degree of acceptance of particular evaluative attitudes and his speed of association time to words referring to that attitude. Studied by questionnaire, positive correlations ranging from .32 to .64 were found between general and specific attitudes. The general tests proved to be more reliable, indicating that general attitudes are more internally consistent than specific attitudes of the same class.

If evaluative attitudes become generalized perhaps we can get an idea of the individual's general attitudes by taking a cross-section of his specific attitudes. Kelley, continuing from whence he was quoted above * remarks:

> Insofar as these principles are attitudes, the question is, are they general or are they specific, just as is factual knowledge? A specific question . . . such as 'when did Lincoln live?' calls for specific knowledge. A specific situation, such as a seat in a theater next to a negro, calls up one's attitude toward negroes. . . . As we can measure both knowledge and habit, we should be able to measure attitude, and by techniques which are a cross between those employed in the measurement of knowledge and of habit. . . . I feel justified in advocating the measurement of such attitudes as have the widest fields of application, as are set off by the largest number of cues, as have the most generalized cues, and as have the most serious racial consequences, rather than an attempt to measure all attitudes or to measure them in terms of their specific features. . . . So also [referring to the scale technique as discussed in reference 96 below] it is very feasible to measure the changes that take place in an individual as a result of, say, a year's instruction in some school subject—perhaps citizenship. . . . For, unless we can in some sense measure a change, we do not know it has occurred.

Thurstone and Chave,[96] in the work cited, state that measurement of attitudes by expressed opinion, does not necessarily mean prediction of what one will *do*. This, however, is not a defect in the measurement of the opinions, as opinions.

In addition to the works previously cited, some of the

* Kelley, *op. cit.*, pp. 107 ff. By permission of the Macmillan Co., publishers.

[96] Thurstone, L. L. and Chave, E. J., The Measurement of Attitude, Chicago, Univ. of Chicago Press, 1929, 96 pp.

recent work in sociology and social psychology should not be overlooked by those interested in the problem of technique, definitions, and principles of attitude measurement. Young [97] has good discussions of the topic and excellent bibliographies. Watson [98] describes tests and techniques in the field, providing a manual for those undertaking research. The other references of importance are included in the bibliographies already cited.

This chapter, which was opened by a quotation from John Dewey,[99] might perhaps be appropriately closed by one from the pen of George Counts [100] who says:

> The American people . . . prefer to place their faith in the irrational rather than the rational forces of society. . . . If America has no social program, the schools can have no such program. As a consequence, the promotion of an intimate and functional relationship between school and society becomes difficult and the teaching of patriotism tends to assume a negative form. . . . In general the American people express a fear of using the schools for purposes of indoctrination. In the great majority of cases, however, this fear is found only in its naïve form. . . . When any segment of the American people teach to their children that their view of the universe, from the functions of the county sheriff to the destiny of man are good, true, and right, they do not feel that they are indoctrinating the coming generation with the peculiar set of beliefs they have inherited from their fathers.

Can the schools indoctrinate?

[97] Young, K., Social Psychology, N. Y., F. S. Crofts & Co., 1930, 674 pp., and Source Book in Social Psychology, N. Y., F. S. Crofts & Co., 1927, 844 pp.

[98] Watson, G. B., Experimentation and Measurement in Religious Education, N. Y., Association Press, 1927, 295 pp.

[99] Dewey, John, *op. cit.*

[100] Counts, G. S., The American Road to Culture, N. Y., John Day Co., 1930, 194 pp., p. 185.

CHAPTER II

The Experiment

I

In searching the field for suitable attitudes to work with, either already in a course of study or easily added to a curriculum, the subject of Science appears strikingly available for experimentation. The subject, in the strictest sense of the term, is a recent addition to elementary school curricula; apparently a number of schools still cling to the old subject of Nature Study (whether they call it Science or not) with its attendant memorization of a lot of apparently useless facts and principles.

To illustrate the modern tendency (not yet fully accepted in practice), I quote from an address by Powers:[1]

> The study of science contributes to the attainment of the aim of education through its contributions to the attainment of understanding of the problems associated with living. Specific objectives are the goals set for instruction. In their origins, the scientific attitudes are necessarily associated with understandings and with exercises in the use of understanding in the process of thinking. Apart from positive and identifiable attainments in the form of understandings and abilities the term 'scientific attitude' seems meaningless. A scientific attitude is an attitude toward methods and achievements. In the learning process these attitudes develop as concomitants to understanding of scientific achievements and scientific methods. The attainment of scientific attitudes represents the highest accomplishment from study in science.

"The combination of knowledges and of scientific skills, habits, and attitudes in science study," says the Thirty-first Yearbook of the N. S. S. E.,[2] "do not suffice to insure the desirable behaviors that we have designated as the real goals of science teaching unless they are so acquired that they yield also the proper attitudes toward the environment. The fact that we have thus far done but little in measuring the results of science study in terms of these interests, attitudes,

[1] Powers, S. R., Science in Education, Address at 12th Annual Meeting of Science Ass'n. of Middle States, Atlantic City, Nov. 1932 [Abst. in Science Ed., 17 (1933), 2, pp. 171-172].

[2] Thirty-first Yearbook of the N. S. S. E., Part I: A Program for Teaching Science, Bloomington, Pub. Sch. Pub. Co., 1932, 370 pp., p. 201 f.

and appreciations should not lead us to overemphasize knowledges and skills as the significant goals. The emphasis on the more easily measured objectives has undoubtedly led to the unverified assumption that to know implies to do and to be." *

After reviewing the work in related fields and considering criticism thereof on the part of authorities from various points of view, the desiderata of an experimental situation seem to be as follows: 1) a group of subjects as young as feasible in order to try to get at the very inception of attitudes and changes if possible; 2) an experimental factor involving the deliberate stressing of the attitude (or attitudes) to be achieved, rather than assuming it to be a concomitant outcome of a unit of subject matter; 3) an experimental factor related to science and the scientific attitude, as being one of the most neglected phases of education in the past, one of the most significant in the light of modern developments, one with a definite relation to previous work, if only among older subjects, and one in which non-scholastic influences play a large, clear-cut rôle; 4) an experimental period of sufficient length to allow changes (if any) to take place, changes of enough significance to be measured; 5) measuring instruments that will permit of approaching the real behavior of the subjects as criteria of their attitudes, as well as their pencil-and-paper behavior; 6) a large enough group of subjects and a large enough group of attitudes to eliminate biased errors.

The attitudes which are set up as objectives in the Course of Study in Science for Intermediate Grades in the city of Baltimore,[3] appear to satisfy these requirements. These attitudes are stated as follows:

1. A feeling of satisfaction in 'getting outdoors.'
   Example: A walk in the open in preference to a moving picture show.
3. A responsibility for suspended judgment until all necessary data are collected.
4. A willingness to change judgment when further data require this change.

* May we refer the reader at this point to the quotation from Caldwell on p. 3 above?

[3] City of Baltimore Department of Education, Elementary Science Course of Study for Grades 4, 5, and 6, Baltimore, 1929, p. 10.

Further on (p. 15) a list of general objectives for science in the intermediate grades is given. One of these [4] is "to be made aware of scientific methods and their application in everyday life."

These attitudes are obviously intended to be developed as "concomitant outcomes" of a very thoroughly worked-out series of units for these grades. The teachers are given no specific directions for stressing attitudes or for bringing them about directly, as they are given directions for bringing about gains in specific habits and skills related to knowledge.

Directions for formulating tests of knowledge and skill are likewise given, but again no direct mention is made of attitudes in connection with any unit here.

As was pointed out in chapter I, the measurement of these outcomes upon which so many forces play has by no means been brought to a point where the individual teacher can be entrusted with the task of formulating a test for attitudes as outcomes of a given lesson or unit. The curriculum sets up these attitudes as concomitant outcomes, as hints for the teacher, but there is no attempt made to check up on the extent of his success in their attainment. These observations are not made in a critical vein but simply for the purpose of pointing out the excellence with which these selected attitudes meet our requirements in setting up an experiment.

The attitudes above mentioned were selected from a total group of five listed in the Course of Study, as best meeting these needs. There are four knowledge objectives listed and five in the field of habits and skills. The two attitudes which were rejected were: 2) "An appreciation of the changes in weather which permit ice skating, sleighing, swimming," and 5) "An appreciation of the need for and the consequences of certain laws pertaining to the conservation of human, plant, and animal life." It was felt that number two would be very difficult to measure, except perhaps as a subsidiary of number one, in which respect it would be taken care of. Although the fifth attitude has possibilities, it is perhaps more closely related to actual information than the others; at

[4] *Ibid.*

least it would be difficult to measure apart from informational elements. This would perhaps be an interesting study to follow the present one. Clearly, however, the three attitudes selected meet our criteria very much better.

Since a major outcome listed among the general objectives in science is awareness of scientific methods and their application in every day life, it seems that items three and four of our list may be combined into one—responsibility for suspending judgment and willingness to change judgment being involved in a general scientificness and open-mindedness. This reduces the attitudes for our experiment to two: 1) appreciation of outdoors, specifically in preference to the moving picture shows, and 2) the so-called scientific attitude.

The subjects for this experiment are more or less predetermined, since the Course of Study selected as an experimental factor is intended for a specific set of children in specific grades in a specific city. Two equated groups of children subjected to the same curriculum by teachers of approximately equal ability, with the experimental group subjected to the single differentiating factor of stressing the attitudes in question, will meet our requirements with respect to subjects. In addition perhaps something may be discerned about the mere teaching of Science *per se* in the elementary school by contrasting our subjects who follow the Course of Study (with or without the experimental factor of attitude-stressing) with a group matched with them in all respects save taking Science as part of the curriculum. So much for our subjects: the grade range will be from four to six, and the age range from eight to sixteen.

The experimental period should of course be as lengthy as possible in order to give such factors as are involved a fair chance to operate. Due to the exigencies of the situation in the school system in which the experiment was put into operation, the desired period of a year was broken into two parts. This was particularly necessary in view of the fact that at the close of the first semester in Baltimore (January 31, 1933) a tremendous shakeup took place throughout the school system, due to retrenchment in expenditures for the

year. Teachers were transferred and retired, supervisors demoted to teaching positions, and classes combined in large numbers. Thus it proved very fortunate that tests were administered at the close of the first semester; as it turned out many of the changes that were made affected classes in the experiment, and the number of subjects available for the second semester (and throughout the year) was greatly reduced.

With the cooperation of the supervisor in charge of Science, a group of teachers were selected who were considered among the most efficient in the system and who were rated high for interest in Science. These were evenly divided between the experimental and control classes. The grades and schools were also so divided. The original set-up which continued for the first semester (a period of four months) was as follows.

TABLE II

EXPERIMENTAL SET-UP FIRST SEMESTER

	X Experimental	Y Control	Z Pure Control (No Science)
School A	Grade 6A & B	Grade 5A & B Grade 4A & B	
School B *	Grade 6B Grade 6A	Grade 6B Grade 6A	
School C	Grade 4B Grade 6B	Grade 4B Grade 6B-5B (combined)	
School D	Grade 6A & B Grade 5A	Grade 6B Grade 5B	
School E †	Grade 5A Grade 4A	Grade 6B	
School F	Grade 5B	Grade 6B	
School G	Grade 5A	Grade 6A	
School H			Grade 5 Grade 6

For the second semester, one new group was added to the experiment, while several dropped out. The set-up was as follows.

* All classes in this school (a platoon) had the same teacher for Science.

† Grades 5A and 4A had one Science teacher; Grade 6B had another.

TABLE III

SECOND SEMESTER SET-UP

	X Experimental	Y Control	Z Pure Control
School A	Grade 6A * & B	Grade 5A * & B Grade 4A & B	
School B	Grade 6A *	Grade 6A	
School C	Grade 4A Grade 6A †		
School D		Grade 6A ‡ Grade 6B § Grade 5A *	
School E	Grade 5B	Grade 5B * Grade 6B ‖ Grade 6A	
School F		Grade 5A * Grade 6A	
School G		Grade 6B ‖	
School H			Grade 5 Grade 6
School I			Ungraded ¶

There were thus only three classes subjected to the experimental procedure throughout the year.

There are discernible differences in the make-up of the population of the schools which should be considered in comparing the results. School A is located in an exclusive residential section, Schools B, C, D, and E are in and around a commercial-industrial area at the opposite end of the town, Schools F and G are in another factory region of inferior make-up, School H is in a tiny country town in the tobacco section of Southern Maryland, and School I is in the business

* Different teacher second semester.
† Control first semester, changed to experimental second (same teacher).
‡ Combined with a few previously in the experimental group.
§ Experimental first semester, changed to control second (same teacher).
‖ Different teacher second semester, and changed from experimental to control.
¶ Group in city system (Pre-vocational course without science) not in experiment first semester.

section, but draws, of course, from all through the city, since there are not many pre-vocational centers. An effort was made to balance the experimental and control groups with respect to this feature, an effort facilitated by the procedures used in equating the groups.

The groups are equated (or equatable) with respect to initial score, chronological age, intelligence (mental age), educational age, by a rough criterion of teacher ability * and by a rough index of economic status.†

The initial scores were obtained, of course, from the first testing.

The intelligence scores were obtained from the regular tests given annually by the Department of Education. In this instance the test used was the Illinois.

The educational ages were obtained from the scores on the Stanford Achievement Test, given just a week or two before the experiment began. This age was based on the average of the reading and arithmetic ages, these two being the only parts of the achievement test given that year.

Teacher ability is roughly taken care of by the fact that all science teachers participating (in the pure-control group there was of course no science teaching) were selected by the supervisor as efficient and interested in Science. This factor was also partially cared for in the shifts of several teachers from experimental to control and vice versa and by the shifting of teachers in and out of the experiment (see table II).

The economic status was determined by securing the parents' occupation from each child and applying it to the Sims Five Fold Scale.[5] More refined measures were considered but felt to be not essentially more valuable than the scale selected. With large numbers the scale values should

* An attempt was made to measure the attitudes of the teachers in the experiment with the hope of using them as equating factors. It failed.

† See table IX, p. 55.

[5] Sims, V. M., Manual of Directions for the Sims Score Card for Socio-Economic Status, Bloomington, Ill., Public School Publishing Co., 1927.

have some significance, and not much more could be secured by other such devices.

With two groups equated in respect to the above items and pursuing the identical curriculum in every respect except that the science teachers of the experimental group are instructed to stress two attitudes in connection with their teaching, we can determine the effect of this experimental factor. By giving preliminary tests at the beginning of the experiment and again at the close of each experimental period (i. e., each semester) we can, theoretically, measure the growth in each group, and if the difference in the gains is significantly in favor of the experimental group, we may attribute this difference to the experimental factor, assuming our group is large enough to cancel out other factors which might bias the results.

II

So much for the set-up of the experiment. There are two attitudes to be tested by some means in order to carry out this plan. "What means shall be employed?" is the next question that arises. The first attitude, appreciation of outdoors, is not one that lends itself very easily to measurement by means of pencil-and-paper test. If the items were to be made reliable and valid, they would have to be disguised so as to be unrecognizable by practically every one concerned: teachers, pupils, and perhaps the experimenter himself.

A different approach was devised as a means of approximating actual behavior in the specific situation involved, viz., choice of outdoors in preference to a motion picture show. Two criteria were set up for this purpose. The first was a ballot, taken as a class vote, in which the children chose between the following options: a trip to the country, a moving picture show, and staying home. The choice was set for the Saturday following the day of the ballot, assuming it to be a "nice" day, and the expenses of the picture show and the trip to the country to be assumed as exactly the same. The percentages voting for each choice were then recorded, and the same vote was taken again at the end of the semester. The difference in changes of percentages would then be attribu-

table to the experimental factor. As a matter of fact, other elements apparently were involved, but more of this later. There was no way of checking on the changes of individuals, as no means of identification were attached to the ballots. This policy was pursued in an effort to insure the children's stating their true choices.

The preponderance of votes for the country trip on the first ballot led to a conclusion in which most of the teachers and principals interested in the experiment concurred; namely, that the phraseology of the voting classed this trip as very much of a "treat," much more so than was the intention of the experimenter. To check on this, although the first ballot was repeated both at the close of the semester and at the close of the year, another choice was also given at the end of the first semester, and this likewise was repeated at the end of the year. This vote permitted the children to choose between a movie show and a walk in the park, as options for after school on the particular day on which the ballot was taken. The home choice was omitted on this second ballot, since it had been included merely to disguise the purpose of the voting, and appeared to be unnecessary. Results of the ballots are given in tables IV to IX.

As a further check on the changes in this particular attitude another experimental criterion was introduced. The children were requested to keep brief diaries of their out-of-school activities for a two-week period in October, another in January, and another in May. These were identified (except through carelessness in a few cases) so that it was possible to check not only group changes but also individual variations. Neither the children nor the teachers were aware of the primary purpose of these diaries, which was of course, to determine the changes in the number of times the child actually went outdoors, as compared with the times he actually went to the movies. It was deemed safe to assume that these would be recorded quite faithfully, or at least that no biased errors would creep into the recording, such as might occur if the child were aware that his behavior was being watched to determine how often he went to the movies.

The results indicate that there was no such suspicion on the part of the children, although there may have been some on the part of at least one of the teachers. As revealed in the tables (see chapter III) the changes were determined by comparison of percentage of total mentions of outdoors and movies which were outdoors and the percentage of total mentions of both which were movies, at each of the three occasions on which journals were kept.

It was found that quite definite rules had to be adopted in checking the diaries as to what sort of an entry would be considered "going outdoors." The experimenter himself did all the checking so there was no variation once a definite formula had been arrived at. Only going outdoors for the sake of being outdoors was included, as for example, going for a walk in the park. Going out on an errand or going out to play were not considered as "going outdoors" in the sense intended in this investigation. The "movies" entries were naturally much more specific, but even here such things as minstrel shows and church movies were eliminated as being outside the activities involved in the Course of Study's statement, as understood by the experimenter. There was some question as to whether group activities, such as a hike in the country would be included among the "outdoors" list. It was finally decided to include these, since most of the movie-going ventures were made in company, either with adults or with playmates, and the same factors presumably are involved.

III

For the purpose of testing the scientific attitude, the techniques mentioned were considered unsuitable. The attitude appears to be too abstract an element to be gauged by ballots or diaries, so with some reluctance, pencil-and-paper tests were resorted to.

Three tests were selected to measure three distinct phases of the scientific attitude with a minimum of overlapping. None of these tests were in a form suitable for use with intermediate grade children, and even after extensive changes had been made in both content and vocabulary, two were still

considered out of the range of fourth grade attainments and were limited to grades five and six. The changes were made, and the tests used, with the permission of the authors, all of whom expressed a very gratifying interest in the experiment.

For measuring the scientific attitude as such, the Curtis Test of Scientific Attitudes [6] was selected, and, with some modifications, used. This test sets up situations in which open-mindedness is tested in one way or another, and either a multiple-choice or true-false answer is selected. The answer to each alternative is given a rating, based on the average rating of a group of science teachers to whom the test was submitted. Twenty-seven items constituted the test in final form. These items are included in the appendix. This test was limited to grades five and six.

It was also decided to use a test that would measure a phase of the scientific attitude that is not so closely related to science, or at least in which scientists would not necessarily predominate, according to Watson's findings [7] and those of numerous others. This, for lack of a better term, is called a test of prejudices. For this purpose, a number of items from the test used by Frederick [8] mentioned above were selected, some slightly altered, and to these were added some from Watson's Test of Public Opinion [9] and one or two others. These were all stated as true-false options. There were 34 items in the final form of the test as used, and in addition, space was provided for the subjects to state what countries, and what races they especially disliked. This was not considered in the scoring. A sample of the test is included in the appendix. This test likewise was not used with fourth graders.

The third test, the only one which was used with all classes in the experiment, attempts to measure still another phase of

[6] Curtis, F. D., Some Values Derived from the Extensive Reading of General Science, N. Y.. Teachers College Bureau of Publications, 1924 (T. C. Contribution No. 163).
[7] Watson, G. B., *op. cit.*
[8] Frederick, R., *op. cit.*
[9] Watson, G. B., *op. cit.*

scientific attitude: viz., superstitions and common beliefs. For this purpose a form of the Garrett-Fisher Questionnaire mentioned above [10] was used, with the vocabulary modified to be comprehensible to intermediate grade children, and some items omitted. Two of the items that were substituted were true statements; all the items in the original questionnaire are really false. These two items were inserted to trap the bright youngsters who might "catch on" to the fact that this was a mere list of common false beliefs and go right down the list marking every item false. As it turned out there were practically no such youngsters. This test is also included in the appendix.

Scoring the tests proved a fairly simple problem to plan, although a laborious task to carry out. The Curtis test was already taken care of by the author's own scheme, which applied quite as well after the omission of a few items since the scores were both plus and minus and clustered about a zero point. For the two true-false tests the formula *R-W* was adopted. It was selected because of its simplicity and because it did not discredit omitted items. Although no directions were given about omitting items, it was felt that such omissions should not be penalized, since open-mindedness would certainly be better indicated by deciding that one cannot answer a certain question, rather than by hastily "slapping down" an answer which has a 50% chance of being correct.

The experiment was set up along these lines. All the tests were given by the experimenter, as were the ballots, so the administration was as nearly uniform as possible. The initial tests were given in mid-October; the second series in mid-January; and the final ones the latter part of May. Thus the first experimental period was about three months in length, the second about four months long. This should be taken into consideration in reviewing the data.

[10] Garrett, H. E. and Fisher, T. R., *op. cit.*

CHAPTER III

The Results

I

The results of this experiment are presented in the accompanying tables.

The data obtained from the ballots will be considered first. This was the simplest device of the experiment. It was not possible to equate the groups to be compared since individuals were not identified, as pointed out in the preceding chapter. Comparison of the experimental and control groups then is simply a matter of measuring the change in percentages of each group voting for the various choices.

TABLE IV

Results of Ballots for Entire Populations

Country

	Group X *			Group Y †				
Date	No.	%	P.E.‡	No.	%	P.E.	Difference Favoring X	P.E. Diff.
Oct.	294	70	1.5	367	69	1.4	+1%	1.8
Jan.	279	63	1.5	275	65	1.6	—2%	1.9
Gain		—7	2.1		—4	2.0	—3%	2.4
May	138	78	2.1	348	74	1.4	+4%	1.9
Total Gain		+8	2.6		+5	1.9	+3%	3.2

Movies

	Group X			Group Y				
Date	No.	%	P.E.	No.	%	P.E.	Difference Favoring Y	P.E. Diff.
Oct.	89	21	1.4	111	21	1.2	0%	1.8
Jan.	104	23	1.4	94	22	1.4	—1%	1.8
Gain		+2	2.0		+1	1.9	—1%	2.7
May	21	12	1.6	77	17	1.2	+5%	1.6
Total Gain		—9	2.2		—4	1.7	+5%	2.8

* The experimental group is referred to as Group X throughout the study.

† The control group is referred to as Group Y throughout the study.

‡ Percentages are considered whole numbers for convenience throughout these tables. Thus P.E.'s are correspondingly multiplied by 100.

Table IV shows the results of the ballots of the entire experimental group and the entire control group. Percentages in the initial vote are almost identical; and the January changes are revealed to be slight, and in the direction not favored by the experimental set-up. The final results show a more marked swing in the direction favored by the set-up, i. e., the experimental group increases its vote for country at the expense of votes for movies. However, the control group does likewise, and the difference between the gains in country and losses in movie votes is still not statistically significant. A seasonal trend, which raises the movie vote and correspondingly lowers the country vote in January, and then reverses itself in May, seems to be more potent than the experimental factor. This is certainly to be expected. The appeal of the great outdoors would be greater in May than in January or October, and greater in October than in January. This is shown in both groups. Differences in the home vote are almost infinitesimal. It would be interesting, if it were possible, to inquire further into that humble nine to fourteen per cent of children who stated they preferred staying home to going on a trip to the country or to the movies. With our data available only in its present form, we can but speculate about them. That there is such a group is quite evident however by the consistency with which that limited but stolid percentage repeats itself in every group at every vote. Quite like our Socialist voters they seem to be, gallantly supporting a lost cause; a much stronger group in proportion to the population, however, and perhaps better worthy of comparison with some European minority party.

The smallness of the population in the final May vote of the experimental group should be pointed out before leaving table IV. This was brought about, of course, by the school upheaval described in chapter II. The difference between gains in percentage voting for country is insignificant both in January and in May, being about the size of its P.E. both times, first favoring one and then the other group. There is no reason to suspect a constant or selective error in the survival of 177 cases of 442, but in order to check further

on the ballot phenomena in general, we turn to table V below.

This table contrasts the results of the two groups which were subjected to the experimental or control procedures for the entire duration of the experiment with the group that changed from experimental to control at midterm. That is to say, the populations of groups X and Y represented here, while considerably overlapping those of table IV, include only the attenuated groups which were not shifted about or eliminated wholly in the upheaval at the close of the first semester.

TABLE V

RESULTS OF BALLOTS FOR GROUPS CONSTANT THROUGH THE EXPERIMENT COMPARED WITH GROUPS SHIFTING THEIR STATUS AT MID-TERM

COUNTRY

	Group W *			Group X			Group Y		
Date	No.	%	P.E.	No.	%	P.E.	No.	%	P.E.
Oct.	142	72	2.1	95	59	2.5	189	66	1.9
Jan.	142	68	2.2	74	61	2.9	168	62	2.0
Gain		—4	3.1		+2	3.8		—4	2.7
May	162	81	1.9	138	78	2.0	186	69	1.9
Total Gain		+9	2.8		+19	3.2		+3	2.6

Date	Difference Favoring X over W	P.E. Diff.	Difference Favoring X over Y	P.E. Diff.
Oct.	—13	3.3	—7	3.2
Jan.	—7	3.6	—1	3.1
Gain	+6	4.9	+6	4.5
May	—3	2.7	+9	2.8
Total Gain	+10	4.2	+16	4.2

MOVIES

	Group W			Group X			Group Y		
Date	No.	%	P.E.	No.	%	P.E.	No.	%	P.E.
Oct.	40	21	2.0	45	28	2.3	63	22	1.6
Jan.	47	23	2.0	27	22	2.4	66	25	1.7
Gain		+2	2.8		—6	3.4		+3	2.3
May	27	14	2.5	21	12	1.5	50	19	1.6
Total Gain		—7	2.7		—16	2.7		—3	2.5

* Group W is the group experimental first semester, control the second.

Date	Difference Favoring X over W	Difference Favoring X over Y
Oct.	—7	—6
Jan.	+1	+3
Gain	+8±4.4	+9±4.1
May	+2	+7
Total Gain	+9±3.9	+13±3.7

We find in table V an initial advantage for the control (Y) over the experimental (X) group, in votes for "country," of 7%, a trifle over twice the probable error of this difference. This is just about cancelled in the second vote, a cancellation which does not quite tell the whole story. There is also a trend away from movies in the experimental group, some of the votes being diverted to "home," which makes a very strong showing in this ballot. In the control group, on the contrary, the movie vote increases by 3%. In May, following the regular seasonal fluctuation, both groups drop in movie preference, and increase in country preference. The difference in the latter between the two groups (X and Y) is fairly significant. Analysis of the gains, shows at the end of the first semester a difference in favor of the experimental group, which is less than one and a half times its P.E. The gains over the entire experiment, however, show a difference in favor of group X which may be considered significant, being well over three and a half times its P.E. This is checked very closely in the movie votes, which reveal a difference of about 2 P.E. at midyear, increasing to very nearly 4 P.E. at the close of the year. The probable errors of these differences are calculated by the short formula $(PE_{(1-2)} = \sqrt{(PE_1)^2 + (PE_2)^2})$ since no correlations were available, the individual votes not being identified. Had a correlation been determined, it might conceivably have decreased the P.E. to a point where the difference in gains for the country votes and losses for the movie votes would be statistically significant.

Group W, which consists of the pupils who were given the experimental factor the first semester and the control procedure the second, shows no significant differences either

the first or the second semester. The difference between groups W and X is about 1.1 P.E. at midyear and about 2.2 P.E. at the close. Curiously, group W outgains group Y in the second semester, when both are control groups, while in the first semester their gains are identical. This may be due to the fact that the influence of the experimental factor carries over more strongly when facilitated by seasonal influences, but the evidence is not sufficiently significant for this assumption.

TABLE VI

RESULTS OF BALLOTS FOR CITY GROUP Z*

	Country			Movies			Home		
Date	No.	%	P.E.	No.	%	P.E.	No.	%	P.E.
Feb.	27	52	4.7	22	42	4.7	3	6	3.3
May	24	83	4.8	5	17	4.8	0	0	0
Gain		31	6.7		—25	6.7		—6	3.3

The results of ballots in city group Z presented in table VI are not directly comparable with any of the larger groups. The group's makeup is considerably different and there was no vote during the first semester. There is a significant gain of votes for country and a decrease in movie votes that is almost significant. There is no home vote on the final ballot in this group, which is of a semi-delinquent makeup. Comparison of the difference in gain in country votes between this group and group X in table V (second semester) reveals a difference of 14 ± 8.3 in favor of the Z group. We might assume that the seasonal factor plays a greater rôle in relation to this inferior group. We must continue to remember, also, that none of these differences is very significant, that is to say there is a chance that none of them would exist in an unrestricted sampling.

* Group Z is the non-science group.

TABLE VII

ANALYSIS OF BALLOT RESULTS BY GRADES

		Country			Movies			Home		
Date	Grade	No.	%	P.E.	No.	%	P.E.	No.	%	P.E.
Oct.	4W	35	81	4.0	5	12	3.2	3	7	2.6
	4X	13	33	5.0	19	49	5.3	7	18	4.0
	4Y	38	86	3.5	6	14	3.5	0	0	0
	5X *	133	70	2.2	43	23	2.0	13	7	1.2
	5Y †	36	52	4.0	17	25	3.5	16	23	3.3
	6X	113	71	2.4	32	20	2.2	14	9	1.4
	6Y	173	71	2.0	48	19	1.7	25	10	1.2
Jan.	4W	35	73	4.2	10	21	4.0	3	6	2.2
	4X	19	46	5.2	14	34	5.0	8	20	4.1
	4Y	31	78	4.3	7	17	4.0	2	5	2.2
	5X	134	63	2.3	46	22	2.0	31	15	1.6
	5Y	39	56	3.9	18	26	3.6	12	18	2.9
	6X	103	66	2.5	34	22	2.2	19	12	2.0
	6Y	148	60	2.2	66	27	1.9	31	13	1.4
May	4W	42	96	1.4	1	2	1.4	1	2	1.4
	4X	29	64	1.9	9	20	4.0	7	16	3.7
	4Y	16	66	3.2	4	17	5.1	4	17	5.1
	5Y ‡	51	66	3.6	14	18	2.7	12	16	2.8
	6X	64	73	3.3	12	14	2.4	11	13	2.4
	6Y	119	72	2.2	32	19	2.0	15	9	1.5

Table VII analyzes the ballots of groups W, X, and Y by grades. Several interesting facts may be noted here. In grade 4, the W group again gains more the second semester when not subjected to the experimental procedure than it does the first when it is so subjected. In fact, country votes decline during the first semester and movie votes increase; the seasonal factor apparently playing an influential part. A wide range is apparent in the initial votes subdivided into classes—anywhere from 33% to 86% of a class may vote for the country trip in October. In January the range is reduced: from 46% to 78% vote for the trip, and in May the range is from 64% to 96%, identical with the January range but much higher in its limits. There do not appear to be significant differences between the grades, fourth grade children having apparently much the same choices as fifth or sixth grade children.

* Includes one combined 5-6 grade—no identification possible.
† Does not include classes in group X first semester.
‡ No fifth grades in X group second semester.

TABLE VIII

BALLOTS OF SECOND SEMESTER: TWO CHOICES

PARK

	Group X			Group Y			Group Z		
Date	No.	%	P.E.	No.	%	P.E.	No.	%	P.E.
Jan.	60	48	3.0	210	46	1.6	16	31	4.3
May	67	51	3.0	227	49	1.6	14	48	6.2
Gain		+3	4.2		+3	2.2		+17	7.5

MOVIES

	Group X			Group Y			Group Z		
Date	No.	%	P.E.	No.	%	P.E.	No.	%	P.E.
Jan.	64	52	3.0	270	54	1.6	36	69	4.2
May	65	49	3.0	239	51	1.6	15	52	6.2
Gain		—3	4.2		—3	2.2		—17	7.5

Difference Favoring Group X over Y in Gain	0	4.7
Difference Favoring Group Y over Z in Gain	—14	7.8
Difference Favoring Group X over Z in Gain	—14	8.6

Table VIII presents the results of the second ballot choice which was given only in the second semester. No significant differences between the three groups are revealed. The park vote is closely parallel to the country vote of the same date but smaller—clearly it does not involve the element of treat, or at least not to the same extent. The difference between groups X and Z in gains is almost identical with the difference revealed in tables V and VI, and likewise in favor of group Z. Groups X and Y keep quite close together before and after. An element not taken into consideration is the first semester influence, which, as we have seen, may carry over to quite an extent.

None of the ballot findings, then, reveal any significant differences between the various groups in the experiment. A trend is shown in the direction of the experimental group, but this is contracted by the seasonal element in numerous instances. Sex differences cannot be considered, again due to the fact that ballots were unidentified.

II

The relative standings of groups X and Y in chronological age, mental age, educational age, and socio-economic status

are shown in table IX. This includes only the cases which were equated for the first semester as explained in chapter II.

TABLE IX

GENERAL FACTORS IN WHICH FIRST SEMESTER GROUPS ARE EQUATED*

Factor	Group X Mean	S.D.	Group Y Mean	S.D.	Difference	P.E. Diff.
N cases	350		350		0	
C.A.	135.8	16.73	136.2	15.20	0.4	.81
M.A.	138.4	18.00	138.2	18.04	0.2	.92
E.A.	140.7	15.65	142.7	17.40	2.0	.83
Socio-Ec.	4.20	0.73	4.26	0.74	0.06	.37

The differences between the groups in each factor are clearly insignificant, and insofar as the tests or scales on which the scores are based are reliable, the two groups may be assumed to be practically identical. One thing must be pointed out in connection with this table. Since only the Garrett-Fisher test was administered to grade 4, the number of cases for the Frederick and Curtis test is decreased in both groups. In group X there were 278 cases for the Frederick test with a mean C.A. of 140.9 and a mean M.A. of 141.0. In group Y there were 279 cases taking the Frederick test, mean C.A., 140.9; mean M.A., 141.0 In group X there were 275 cases taking the Curtis test with the mean C.A., 140.8; mean M.A., 141.1. Group Y had 276 taking the Curtis test with a mean C.A. of 141.0; mean M.A., 141.1. Thus the two groups are still closer together in these comparisons than in the larger groups of 350 each.

TABLE X

RESULTS OF THE GARRETT-FISHER TEST, EQUATED GROUPS

Date	Group X Mean	S.D.	Group Y Mean	S.D.	Difference in Favor of X
Oct.	+ 4.42	10.67	+4.00	9.95	+0.42 ±.52
Jan.	+11.37	13.75	+4.09	10.40	+7.28 ±.60
Gain	+ 6.95 ±.465		+0.09 ±.320		+6.86 ±.56

Table X shows the results of the Garrett-Fisher (superstitions and common beliefs) test for these two groups. There

*For initial scores, in which the two groups were also equated, see the separate results of each test.

is a significant difference in the gains for the first semester, in favor of Group X. The control group's gain is smaller than its P.E. To the extent of 12 P.E. difference, the control group was outgained by the procedure in the group in which the experimental factor was applied.

TABLE XI

RESULTS OF THE FREDERICK TEST, EQUATED GROUPS

	Group X		Group Y		Difference
Date	Mean	S.D.	Mean	S.D.	in Favor of X
Oct.	—0.55	4.95	+0.12	7.00	+0.43 ±.30
Jan.	+1.01	7.80	+0.96	8.52	+0.05 ±.41
Gain	+1.56 ±.119		+1.08 ±.197		+0.48 ±.23

Table XI shows results of the Frederick (prejudice) test with the same groups compared. Both groups made significant gains on this test, which would indicate that factors outside the situation provided in the experiment exert some influence. The situations involved in the test are much less closely related to the subject-matter of the Science Course of Study than is that of either of the other tests, and to that extent the experiment involves some transfer. On the other hand, the attitude of open-mindedness is set up definitely and there is no good reason why it should not apply to racial and national and religious attitudes as well as to common beliefs. The difference is in favor of group X but it is only twice its P.E.

TABLE XII

RESULTS OF CURTIS TEST, EQUATED GROUPS

	Group X		Group Y		Difference
Date	Mean	S.D.	Mean	S.D.	in Favor of X
Oct.	—9.79	14.72	—10.54	14.14	+0.75 ±.73
Jan.	—6.17	16.15	— 4.18	15.54	—1.99 ±.81
Gain	+3.60 ±.551		+ 6.36 ±.670		—2.76 ±.94

Table XII above presents the results of the Curtis (Scientific Attitude) test. This is judged to hit most closely at the subject-matter of the Course of Study in Science, although not by any means intended as a gauge of knowledge in that field. Both groups make significant gains but this time

the advantage favors group Y. The difference is not quite 3 P.E., however, and hence might be attributed to chance.

TABLE XIII

RESULTS OF DIARIES, EQUATED GROUPS *

	Group X (N=253) Outdoors		Movies			Group Y (N=350) Outdoors		Movies			Diff. Fav.	P.E.
Date	No.	%	No.	%	P.E.	No.	%	No.	%	P.E.	X	Diff.
Oct.	193	37	224	63	1.5	255	39	401	61	1.2	—2	2.0
Jan.	174	40	265	60	1.6	258	34	507	66	1.1	6	3.9
Gain in Outdoors		+3			2.2		—5			1.7	+8	2.8

Table XIII presents the results of analysis of the diaries for the two groups. As shown in table XIV, the original groups reveal a significant difference in initial percentages that cannot be accounted for except perhaps by the brevity of the period for which the diaries were kept. By reducing group X to 253 cases, the initial percentages reported are brought into fairly close agreement without seriously affecting the comparative standings in other factors. The difference in gain of percentage of outdoors reported is in favor of group X, their gain of 3% being remarkable in consideration of the seasonal element which had apparently a marked effect on the ballots. The Y group apparently yielded to this influence, and the outdoors vote dropped in January. However, the difference in the gains is less than 3 P.E.

TABLE XIV

RESULTS OF DIARIES: ORIGINAL GROUPS

(Not Equated for Initial Percentage)

	Group X Outdoors		Movies			Group Y Outdoors		Movies			Diff. Fav.	P.E.
Date	No.	%	No.	%	P.E.	No.	%	No.	%	P.E.	X	Diff.
Oct.	259	32	555	68	.54	255	39	401	61	1.27	—7	1.7
Jan.	248	31	550	69	.54	258	34	507	66	1.14	—3	2.4
Gain in Outdoors		—1			1.6		—5			1.7	+4	2.3

* Original X group decreased by 97 cases in order to equate initial percentages. Mean C. A. of this X group is 135.0; mean M. A., 135.7 (see table IX for group Y).

In table XIV with a significant difference in initial percentage favoring group Y, the difference is lowered in January and the gain is again in favor of group X, but this time less than twice its probable error.

To sum up the findings of tables IX to XIV inclusive, we find no significant differences on any of the experimental criteria except on the test of superstitions and common beliefs. Of the other three, two favor group X and one favors group Y, but none to the extent of certainty. Is the brevity of the experimental period a cause of this? The next set of tables, presenting results for the entire year, may help give the answer to this question.

III

TABLE XV

GENERAL FACTORS IN WHICH ENTIRE-YEAR GROUPS ARE MATCHED

Factor	Group X Mean	S.D.	Group Y Mean	S.D.	Difference	P.E. Diff.
C.A.	129.9	12.30	130.4	12.24	0.5	1.56
M.A.	145.1	15.84	141.4	15.78	3.7	1.96
E.A.	147.3	17.52	140.9	14.70	6.4	2.00
Socio-Ec.	3.9	1.06	4.1	0.74	0.2	0.12
N cases	55.		55.		0	

Table XV presents for the matched groups the relative standings in the equating elements. As we would expect from groups selected by pairing with regard to C.A. and M.A., it is evident that they are very closely matched in these respects. There is, however, some indication of difference with regard to E.A.

TABLE XVI

RESULTS OF GARRETT-FISHER TEST: MATCHED GROUPS

Date	Group X Mean	S.D.	Group Y Mean	S.D.	Difference in Favor of X	P.E. Diff.
Oct.	+ 6.87	9.24	+5.38	9.18	+ 1.49	1.18
Jan.	+15.54	10.20	+4.94	9.54	+10.60	1.29
Gain	+ 8.67 ±.283		— .44 ±.224		+ 9.11	.360
May	+15.43	12.24	+8.15	11.70	+ 7.28	1.51
Total Gain	+ 8.56 ±1.08		+2.77 ±1.06		+ 5.79	1.14

Table XVI shows the results of the test of superstitions among these 55 cases. The initial scores are quite even, the experimental group having a slight advantage. The January gain of the experimental group is clearly significant and the control group makes the difference in favor of group X still larger by losing .44. The difference in gain is over 25 times P.E. at this point. In May the X group loses a bit while the Y group gains, and the total gain is still significantly in favor of group X, just about 5 times P.E.

TABLE XVII

RESULTS OF FREDERICK TEST: MATCHED GROUPS

Date	Group X Mean	S.D.	Group Y Mean	S.D.	Difference in Favor of X	P. E. Diff.
Oct.	+0.18	6.45	—0.67	7.65	+0.85	1.47
Jan.	+1.49	7.25	+0.78	9.40	+0.71	1.31
Gain	+1.31 ±.259		+1.45 ±.231		—0.14	.348
May	+4.77	5.42	+5.18	10.75	—0.41	1.30
Total Gain	+4.59 ±.925		+5.85 ±.742		—1.26	1.18

The Frederick test shows insignificant differences throughout as revealed by table XVII, above. Both groups gain much more the second semester than the first. The difference in total gain, which favors group Y, is just about the size of its P.E.

TABLE XVIII

RESULTS OF CURTIS TEST: MATCHED GROUPS

Date	Group X Mean	S.D.	Group Y Mean	S.D.	Difference in Favor of X	P.E. Diff.
Oct.	—0.91	14.56	—5.79	15.30	+4.88	2.28
Jan.	+2.82	18.00	—4.29	16.00	+7.11	2.63
Gain	+3.73 ±1.51		+1.50 ±1.43		+2.23	2.08
May	+4.17	15.40	+2.36	18.00	+1.81	2.55
Total Gain	+8.08 ±1.47		+8.15 ±1.79		—0.07	2.32

On the Curtis test the experimental group outgains the control during the first semester by about the P.E. difference, but the latter catch up during the second and the total gains are almost identical, with the difference a small fraction of its P.E.

TABLE XIX

RESULTS OF DIARIES: MATCHED GROUPS

	Group X					Group Y					Diff.	
	Outdoors		Movies			Outdoors		Movies			Fav.	P.E.
Date	No.	%	No.	%	P.E.	No.	%	No.	%	P.E.	X	Diff.
Oct.	39	28	101	72	2.5	25	39	38	61	4.1	—11	5.2
Jan.	56	42	76	58	3.1	52	42	73	58	2.9	0	4.3
Gain in Outdoors	+14				4.1		+3			5.1	+11	5.7
May	36	39	57	61	3.4	36	40	55	60	3.4	— 1	4.9
Total gain in Outd's	+11				3.5		+1			6.6	+10	7.5

The diaries (shown in table XIX) reveal the same initial advantage for group Y, which is cancelled by the close of the first semester. In total gain group X is slightly superior, under 2 P.E. difference. Both groups *drop* slightly in outdoors in May. Looked at in another way, group Y remains fairly constant throughout the experiment, shifting not more than 3% at one time, while group X jumps up 14% (over 3 P.E. gain) in January, presumably a time when outdoors would be expected to drop. In May the X group maintains their relative superiority over the October showing, less a slight (3%) drop. The smallness of the group makes all the figures insignificant due to high P.E.'s.

TABLE XX

COMPARING RESULTS OF 39 MATCHED CASES IN GROUPS X, Y, AND W

A. *Garrett-Fisher Test*

Date	Group X Mean Score	Group Y Mean Score	Group W Mean Score
Oct.	+6.26	+6.26	+4.44
Jan.	+10.31	+6.49	+9.38
May	+12.74	+8.63	+6.33

B. *Frederick Test*

Oct.	+0.31	—1.25	+0.97
Jan.	+1.59	+0.73	+0.12
May	+4.07	+4.24	—0.42

C. *Curtis Test*

Oct.	—1.58	—5.84	—11.50
Jan.	+3.17	—4.95	—6.77
May	+4.45	+2.34	—4.15

D. *Diaries*

Date	Outdoors No.	%	No.	%	No.	%
Oct.	12	14	23	40	37	30
Jan.	38	42	49	42	25	22
May	20	33	30	39	21	30

E. *Equating Data*

C.A.	129.3	132.7	132.3
M.A.	146.9	141.7	141.1

Table XX presents results of 39 cases in each of three groups, the wholly experimental, the wholly control, and the group that shifted from experimental to control at the end of the first semester. The sampling is unfortunately not large enough to base any important conclusions upon, and it was also difficult to match for initial results on C, the Curtis test, and D, the Diaries, without still further cutting down the numbers, so as to make them almost entirely valueless. On the superstitions tests, the experimental group gains steadily both semesters, the control group gains very slightly each semester and the W group gains during the time it is subjected to the experimental factor and loses during the time it is not so subjected, but its loss is not equivalent to the gain made the first semester.

On the social attitudes (Frederick) test not quite the same results appear. The control group outgains the experimental slightly the second semester, and group W loses both semesters, losing a little more when experimental than when control! However, none of the differences appear very large.

On the test of scientific attitudes, all three groups gain throughout the experiment and since they are not matched for initial scores, further analysis of the results would have but little meaning.

From the diaries, some odd results can be culled, no doubt due to the restricted sampling and the initial inequality. The X group gains markedly the first semester and falls off somewhat the second, when outdoors would be expected to appeal more. The control group stays very much on a level, and the group W people follow the season rather than the experimental factor!

TABLE XXI

COMPARING 16 MATCHED CASES IN GROUPS Y AND Z

	Group Y		Group Z		Diff. in	P.E.
	Mean	S.D.	Mean	S.D.	Favor of Y	Diff.
C.A.	136.7	12.00	136.4	12.78	+0.3	3.2
M.A.	139.1	11.04	138.4	11.94	+0.7	3.0
Oct. G.-F.	+6.88	10.3	+6.00	10.6	—0.88	2.7
Jan. G.-F.	+7.25	11.9	+8.88	9.0	—1.63	2.7
May G.-F.	+7.38	13.9	+9.75	7.5	—2.37	2.8
Oct. Fr.	—0.77	6.7	—7.13	7.4	+6.36	1.8
Jan. Fr.	+2.81	8.3	—3.50	6.3	+6.31	1.8
May Fr.	+4.81	10.7	—1.25	7.2	+6.06	2.4
Oct. Curtis	—6.15	16.4	—13.91	10.6	+7.76	3.7
Jan. Curtis	—7.29	17.4	—14.59	12.3	+7.30	3.6
May Curtis	—2.69	19.6	—19.84	8.7	+17.15	3.8

TABLE XXII

COMPARING 7 MATCHED CASES IN GROUPS X AND Z

	Group X		Group Z		Diff. in	P.E.
	Mean	S.D.	Mean	S.D.	Favor of X	Diff.
C.A.	133.0	3.4	131.8	5.4	+1.2	1.6
M.A.	143.1	14.0	142.0	11.1	+1.1	6.4
Oct. G.-F.	+3.14	10.3	+7.71	5.5	—4.57	2.9
Jan. G.-F.	+7.43	10.2	+9.71	7.4	—2.28	3.2
May G.-F.	+12.29	9.1	+11.14	9.4	+1.15	3.3
Oct. Fr.	+3.71	5.8	—3.14	6.9	—0.57	2.2
Jan. Fr.	0	4.2	—2.00	5.2	+2.00	1.7
May Fr.	+2.00	3.7	—2.86	5.7	+4.86	1.7
Oct. Curtis	+2.21	7.3	—17.29	8.4	+19.50	2.8
Jan. Curtis	+6.64	12.9	—9.07	12.9	+25.71	4.5
May Curtis	+5.93	15.4	—19.29	12.4	+25.22	4.5

Tables XXI and XXII compare very small samplings of cases paired with group Z: the group which had no science whatsoever. These tables have little value because of the small number of cases; but considering the fact that the cases were paired and match up initially with but one exception (the X and Z groups with respect to the Curtis tests), they may serve to indicate a trend.

Comparing group Y with group Z we see that in both the group which has science but no attitude-stressing, and in the group which has no science at all, there is a consistent gain in the January test of superstitions over the October test and in the May test over the January test. The gain in the non-

science group *exceeds* that of the science group at both points, but at no time is the difference significant. On the social attitudes test there is a difference in initial scores, favoring the Y group, that is almost significant. Both groups gain steadily through the experiment and at the conclusion, just about the same relative standings are shown. On the test of scientific attitudes, the Y group has a large (though not significant) initial advantage; both groups lose very slightly on the second test, but on the third, group Y regains its loss and considerably more, while group Z loses even more. The final difference between the two groups is statistically significant: about 4.5 P.E. Since this test is most closely related to actual science teaching, it would be expected that the science group would surpass the non-science group; the other differences may presumably be attributed to chance.

Comparing the cases in group X with group Z, we find no significant differences at any point, on the test of superstitions: both groups gain consistently and the gains of the X group are somewhat larger. The Frederick test tells a slightly different story, the group Z people losing in May as compared to January, while the X children gain steadily. There are no significant differences here either. The Curtis scores are not really comparable since the initial difference is 7 P.E. in favor of group X. Both groups gain in January and lose in May, but the difference in favor of group X is significant at all times.

The only test of the three which seems to discriminate between science and non-science groups, if these tables can be relied upon, is the Curtis test of scientific attitudes. It is unfortunate that the diaries and ballots of the Z group could not be compared, but the situations of the children in the little country town were shown to be so different from those in the city that this was not feasible. A trip to the country, for example, meant nothing to the group Z youngsters: they *were* in the country. Movies and park were equally ridiculous offers, since there are neither movie-houses nor parks in their village.

In general, it might be of passing interest also to note that

the country children were certainly not more superstitious nor more prejudiced, if the tests are dependable, than their city cousins, nor did the teaching they receive make them more so in either case.

TABLE XXIII

COMPARING 14 MATCHED CASES IN GROUP Y AND CITY GROUP Z

	Group Y		Group Z		Diff. in	P.E.
	Mean	S.D.	Mean	S.D.	Favor of Y	Diff.
C.A.	162.7	10.8	164.4	8.1	—1.7	2.51
M.A.	138.1	11.2	135.4	10.7	2.7	2.58
Socio-Ec.	4.6	0.14	4.4	0.47	0.2	0.38
Jan. G.-F.	+9.18	8.9	+7.06	8.7	2.12	1.7
May G.-F.	+8.35	12.6	+9.24	12.4	—0.89	2.6
Gain	—0.83		2.18		3.01	
Jan. Fr.	+2.77	8.0	—2.24	6.6	5.01	1.1
May Fr.	+1.77	9.9	—3.06	8.4	4.83	2.1
Gain	—1.00		—0.82		—0.18	
Jan. Cur.	—6.62	12.6	—7.35	14.7	0.73	3.2
May Cur.	—9.59	12.2	—6.71	14.5	—2.88	3.1
Gain	—2.97		0.64		—3.61	

Table XXIII contrasts results of the non-science group taken from the boys' pre-vocational school in the city with paired cases in group Y. No significant differences appear except in the initial score on the prejudice test: a difference which favors group Y. The Z group, however, outgains the Y group (in the sense that its loss is less) and the final difference is not significant. The difference in the Curtis test is very slight, the city boys evidently suffering no serious lack, in respect to this test, from their non-science course of study.

TABLE XXIV

COMPARING 14 MATCHED CASES IN GROUP X AND CITY GROUP Z

	Group X		Group Z		Diff. in	P.E.
	Mean	S.D.	Mean	S.D.	Favor of X	Diff.
C.A.	162.9	8.76	162.5	10.0	0.4	2.42
M.A.	136.6	12.96	135.9	11.1	0.7	3.12
Socio-Ec.	4.2	1.8	4.4	0.80	—0.2	0.36
Jan. G.-F.	+0.71	7.6	+7.14	8.0	—6.43	2.0
May G.-F.	+6.00	9.5	+7.03	11.7	—1.93	2.7
Gain	5.29		0.79		4.30	
Jan. Fr.	—0.79	7.4	—2.50	7.1	1.71	1.9
May Fr.	—1.86	9.2	—4.43	7.7	2.57	2.2
Gain	—1.07		—1.93		0.86	
Jan. Cur.	—9.93	16.4	—7.79	13.5	—2.14	3.9
May Cur.	—13.68	16.2	—6.75	14.5	—6.93	4.0
Gain	—3.75		1.04		—4.81	

Table XXIV shows the results of matched cases in the X group compared with city non-science pupils. The differences are not significant in any test at any time. Curiously enough, the Z group outgains the X group on the Curtis test in this case; in the other two tests the X group outgains the Z: The latter two tables present results of only one semester, since that is the length of time that city group Z was included in the experiment.

TABLE XXV

SEX DIFFERENCES IN THE EQUATED GROUPS

	Group X Boys		Group X Girls		Group X Diff. Fav.	P.E.
	Mean	S.D.	Mean	S.D.	Boys	Diff.
Oct. G.-F.	+6.00	11.68	+4.92	11.30	+1.08	.93
Jan. G.-F.	+7.83	12.08	+8.53	12.06	—0.70	.98
Gain	+1.83		+3.61		—1.78	1.19
Oct. Fr.	+0.12	8.70	—0.70	7.25	+0.82	.65
Jan. Fr.	+0.89	7.90	+0.85	8.35	—0.04	.66
Gain	+0.77		+1.55		—0.86	.44
Oct. Cur.	—7.91	13.90	—9.74	13.00	+1.63	1.09
Jan. Cur.	—5.21	17.10	—8.00	15.40	+2.79	1.32
Gain	+2.70		+1.74		+1.16	1.20

	Outdoors		Outdoors		Outdoors	
	No.	%	No.	%	%	
Oct. Diaries	114	28±1.5	130	33±1.5	—5	2.1
Jan. Diaries	116	29±1.5	133	33±1.5	—4	2.2
Gain in Outdoors		+1		0	+1	3.0

	Group Y Boys		Group Y Girls		Group Y Diff. Fav.	P.E.
	Mean	S.D.	Mean	S.D.	Boys	Diff.
Oct. G.-F.	+2.67	10.08	+4.62	10.64	—1.95	.87
Jan. G.-F.	+5.05	10.40	+5.00	11.76	+0.05	.94
Gain	+2.38		+0.38		+2.00	.80
Oct. Fr.	—0.39	7.80	—1.24	7.68	+0.85	.64
Jan. Fr.	+0.96	8.55	—0.63	8.68	+1.59	.71
Gain	+1.35		+0.61		+0.74	.47
Oct. Cur.	—10.66	15.00	—9.18	13.04	—1.48	1.17
Jan. Cur.	—1.97	15.70	—7.81	15.20	+5.84	1.29
Gain	+8.69		+1.37		+4.36	1.54

	Outdoors		Outdoors		Outdoors	
	No.	%	No.	%	%	
Oct. Diaries	123	41±2.2	108	42±2.1	—1	3.0
Jan. Diaries	135	32±1.5	94	38±2.0	—6	2.5
Gain in Outdoors		—9		—4	—5	3.9

Table XXV presents sex differences throughout the first semester equated groups. There seems to be no really significant difference at any point. The boys outgain the girls on the Curtis test in both groups (experimental and control). In group Y the boys outgain the girls on the other two tests likewise. In group X the girls outgain the boys on the other two tests. The X boys outgain the girls in per cent of outdoors, and the Y girls outgain the boys in this factor. The boys seem to attend movies more often than the girls; this conclusion is borne out by several other studies including the one cited above [1] by the Women's Education Club of U. C. L. A. But as for differences in superstitions, prejudices, or the scientific attitude, we cannot, from these results, call either sex superior. From the fact that the X girls generally outgain the boys, while the Y boys generally outgain the girls, it might be inferred that the girls felt the influence of the experimental factor more strongly than the boys, but more accurate comparisons need to be drawn to justify this conclusion. It would, however, be in line with the generally accepted theory that girls are more docile and diligent in school, hence are affected more by it.

The reliabilities of the three tests used in the experiment, obtained from the correlations in the large groups, matched for one semester, are presented in table XXVI.

TABLE XXVI

CORRELATIONS OF THE INITIAL AND FINAL TESTS: EQUATED GROUPS

	Group X	Group Y
Garrett-Fisher	+.46±.03	+.62±.02
Frederick	+.78±.02	+.76±.02
Curtis	+.52±.03	+.30±.04

The Frederick test is consistently the most reliable. We should expect the correlation in group Y to express reliability more accurately than that in group X in which it is supposed there is an additional factor, which is related to the test scores, that is playing a rôle. If this is the case, the

[1] Women's Education Club of U. C. L. A., *op. cit.*

Garrett-Fisher test is more reliable than the Curtis. None of the reliabilities obtained is very high, nor is any very low. Our criteria for test-reliabilities in general are probably not applicable to attitude-tests, on the assumption that out-of-school factors are much more involved in these measures and also that they fluctuate much more than knowledges or skills.

TABLE XXVII

INTERCORRELATIONS OF TESTS, AND CORRELATIONS WITH C.A. AND M.A.

	C.A.	M.A.	G.-F. Test	Fr. Test
G.-F. Test	+.12±.04	+.01±.04		
Fr. Test	+.14±.04	+.10±.04	+.47±.03	
Cur. Test	+.01±.04	+.33±.04	+.36±.04	+.28±.04

In table XXVII we present some intercorrelations of the tests with each other and with chronological and mental age. The population is group X (275 cases that took all tests). The Garrett-Fisher test has fairly low positive correlations with the other two tests and extremely low correlations with C.A. and M.A. From the latter figure it is safe to say that there is no relationship between mental age and score on the Garrett-Fisher test, in this group. The Frederick test is very slightly more closely related to both C.A. and M.A. than is the Curtis, but not so much as to make any degree of prediction of a score from an M.A. valid. Yet the relation between Garrett-Fisher and Frederick is highest on the table. The Curtis test correlates very evenly with the other two tests and has a quite high (compared with the other tests) relationship to mental age. The correlation of Curtis score with C.A., however is just about zero.

None of these obtained correlations is so high as to lead one to feel that there is any serious overlapping in any of the tests, or that test score is a function of chronological or mental age. The correlations for the most part are what one would expect from the composition of the tests. The extremely low (non-existent) relations discovered between Garrett-Fisher scores and mental age, and between Curtis test and chronological age may be a bit unexpected, but not startlingly so.

CHAPTER IV

Criticisms and Conclusions

I

The value of the data presented is dependent on some assumptions which may be open to question. The extent to which the tests that were used actually measure attitudes is doubtful. Several discussions have been cited above (pp. 31 ff.) on the reliability of pencil-and-paper responses in general as indices of attitudes. Since there was no better way available, or at any rate, feasible, it was hoped that by attempting to measure three fairly discrete aspects of the so-called scientific attitude by means of this type of test, the general validity of the measuring instruments would be enhanced. In addition it was thought that the further checks of ballots, registering what the children wanted to do, and diaries, registering what they actually did, would serve as fairly close approaches to behavior in specific situations, the truest test of real attitudes.

The tests might be criticised on the ground that some of the items, particularly on the Frederick Test of Social Attitudes, are dependent on information; i. e., that it is impossible to respond accurately without a certain minimum amount of information about the subject in question. This criticism might apply likewise, perhaps in a lesser degree, to the other two tests used. Undoubtedly it is difficult to divorce attitude from information in this type of test. In fact it might be said that the scientific attitude is so largely dependent on information that it would be wrong to attempt to separate the two. Thus if a difference in information results in a difference on the test scores, it is quite justifiable to conclude that the attitudes are changed, since initially the two groups are equivalent in both respects, and it is hard to see how any constant factor could enter into the picture in one group and not in the other, outside the bounds of the experiment. We feel that if the teachers in stressing the attitudes in the experimental group, gave information to their charges

which the control pupils did not get, resulting in an attitude gain on the part of the experimental pupils, this would be a quite justifiable part of the experimental factor. However, results seem to show pretty clearly that this did not occur, so it is unnecessary to discuss this point at any length here.

The somewhat arbitrary scoring, particularly on the Frederick test, might be questioned. It is quite conceivable that there would be no general agreement about many of the items, even among experts in the field. However, some definite standards had to be set up, so the key was made to be as consistent as possible with the idea of open-mindedness (scientific attitude) and the further provision for not scoring omitted items was made. Since comparisons between the groups were not on the basis of absolute scores, but of gains, with the groups matched initially, no serious harm could be done by the manner in which the tests are scored. On all but three or four items of the total of one hundred and one on the three tests it would seem that agreement of authorities would be fairly universal. The scoring of the Curtis test (see appendix) was, in fact, based on the consensus of authoritative opinion. There can be little argument about the scoring of the Garrett-Fisher items, which were stated almost verbatim as derived from a list of common misconceptions, with two true statements inserted by the experimenter, as explained above (p. 47).

The objection may be raised that some of the test items are poorly stated, as for example, a number of items (9 of 34) on the Frederick test, which is of the true-false type, are stated negatively. Examination of these items should reveal, however, that the terminology employed in the statement is an approximation of the way attitudes themselves are stated.

A further criticism of the Frederick test which might be offered is that it includes material entirely unrelated to the subject-matter of the Science Course of Study. However, one idea of the scientific attitude is that it may be taken to mean open-mindedness on all questions. If the experimental group had gained significantly more than the control on this test, transfer to a different field of open-mindedness could have been assumed.

One comment might be made regarding the ballots: there was no means of individual identification, which prevented more refined measures of changes in individuals. To this the rejoinders might be made that 1) the measuring instruments were deemed too crude to detect very fine shades of difference, 2) identification of the votes, no matter how cleverly concealed, might have led to deception. It seemed safer to get crude but accurate measures than refined ones based on deceit.

Another justifiable criticism of the ballots is concerning the inclusion of the *home* choice, which apparently added little to the value of the findings. This, as well as the somewhat misleading idea of *country* offered as the outdoors alternative, were partially corrected in the second and third votes.

As for the diaries, it is difficult to see how the experimental technique involved could have been improved upon. Had they been kept throughout the year, and samplings taken at specified times, the results might have been more accurate, but the number of cases would surely have been less. Two weeks, even, taxed the patience of a number of young Pepyses and their diaries were reduced to single line statements and sometimes ditto marks. Multiplying the time by eighteen would undoubtedly have increased the ditto marks, and hence decreased the value of the items.

The method of scoring the diary entries was as simple as possible, consistent with the crudeness of the instruments. Percentages appeared to be the only reliable way of gauging changes. The wide array of activities revealed by the diaries, as well as the range in both descriptive ability and variety of interests made it really impossible to do more analysis in connection with this point. It is hoped that in the near future opportunity will offer for a detailed analysis of the activities reported in these diaries, not solely movies and outdoors, which may offer some interesting and possibly useful information.

One objection might be raised concerning diaries: the question of the reliability of children's recordings of their

activities. To this the answer may be given that 1) as far as possible the activities were recorded at the close of each day (of course there must have been some exceptions), 2) there is no reason for expecting that memory for outdoors would be keener than memory for movies, or *vice versa*, 3) no child had any idea of what items were being checked in the diaries, and hence no motive for being intentionally inaccurate.

II

With the limitations discussed above in mind, the results of the experiment indicate that the following conclusions might be drawn:

1) The introduction of the added factor of stressing the scientific attitude in the teaching of science increases the gain of a group of intermediate grade children on a test of superstitions and common beliefs by a margin significantly superior to the gain of a group similar in every other respect.

2) The introduction of the added factor of stressing scientific attitude does not result in a significant difference in gain on tests of a) general social and national attitudes, or b) tests of scientific attitude.

3) In the teaching of science in the intermediate grades, the introduction of the added factor of stressing the attitude of preference of outdoors to movies does not significantly increase the percentage of those voting for a trip to the country in preference to staying home or going to a movie show, beyond the increase of a group which was similar in every other respect.

4) Stressing the attitude of preference of outdoors to movies does not result in a significant difference in gain in percentage of times outdoors are recorded in diaries kept for two-week periods, beyond the gain of the group otherwise similar.

5) There is a tendency for children to vary their choice of outdoors and movies in a ballot with change of season: i. e., the vote for outdoors tends to be largest in spring, next largest in the autumn, and smallest in the winter, while the

vote for movies reverses this order and is largest in winter and smallest in spring. Introduction of the factor of stressing the attitude of preference of outdoors does not seriously affect the operation of this seasonal trend in the ballots. The same trend is found in a group subjected to this factor one semester and " released " from it the second semester, as well as in a group not subjected to the teaching of science at all. The same trend is shown in a choice between a walk in the park and a trip to the movies, operating with equal strength in experimental and control groups, and with still greater influence in a group not being taught science.

6) This tendency to register preference varying with the season is not borne out extensively by diaries recording the actual activities of the same children. Although the outdoors choices in the May diaries exceed those of the October diaries in both groups, the outdoors choices in January exceed those of May in both groups. The experimental factor seems to operate more strongly in what the children actually *did* than in what they *voted* for doing. The evidence for these findings is by no means conclusive.

7) School grade does not significantly affect the choices as shown in the ballots.

8) A trip to the country appears to involve a more attractive choice for city children than going to a movie show, with all external conditions, including the expense, the same. This choice is not affected markedly by the introduction of the experimental factor of stressing preference for outdoors to movies. A walk in the park and going to a movie offer very much the same attraction to these children, with other factors kept identical. The experimental factor makes no difference in this choice, either.

This conclusion does not hold good for the retarded (non-science) pre-vocational school boys. The country trip appeals slightly more than the movie in the winter, and very much more in the spring, for this group. The movies exceed the park in appeal considerably in winter, and very slightly in spring.

9) The gain of a group taught science, but not stressed

with respect to the scientific attitude, for one semester, is not significant in a test of superstitions and common beliefs. Nor is the gain for an entire year, of a smaller group, significant in this test. The test score appears to be related more to stressing of the attitude than to gains in knowledge concomitant to the science course of study. Gain on a test of scientific attitudes appears not to be so closely related to stressing the attitude in question. Other factors evidently play a part. Low scores of groups not being taught science, however, indicate that there may be some relationship between studying science and score on this test, in the grades involved. Gains on a test of social attitudes appear not to be related to stressing the open-minded attitude in connection with science teaching. There may be some slight relation to the school curriculum of these groups in general, as evidenced by the losses or very slight gains of the city and the country non-science groups in this test, but there is no real evidence for this assumption. Some factor or factors, perhaps sheer maturation, play a part in the gain.

10) Boys and girls of grades four to six do about equally well on tests of superstitions, prejudices, or the scientific attitude and likewise tend to gain about the same amounts on these tests in the same time, other things equal. Boys and girls are affected to very much the same extent by the introduction of the factor of stress of certain attitudes in connection with science teaching, as revealed by test scores and diary records of out-of-school activities. There appears to be no significant sex difference in percentage of times going outdoors is recorded in these diaries as compared with the per cent of times going to movies is recorded.

11) Scores on tests of superstition, prejudice, or scientific attitude are not significantly related to chronological age among elementary school pupils in the intermediate grade. Scores on tests of superstitions and prejudice are not significantly related to mental age in this group. Scores on the test of scientific attitude are somewhat related ($+ .33 \pm .04$) to mental age in this group. Scores of the tests of scientific attitude, prejudice, and superstitions are somewhat related to

each other in this group (the correlation ranging from +.28 to + .47). In no case is the relationship high enough for significant prediction.

For this reason and because of the differences in the outcomes of the experiment, it may be assumed that prejudices, superstitions, and the scientific attitude are distinctly different kinds of attitudes, at least for the group in question.

Of these statements, only the first four are based on the original set-up and are the direct outcomes of this investigation. The others are more or less indirect findings, whose importance depends upon one's viewpoint.

CHAPTER V

Summary and Suggestions

I

This study attempted to measure the influence of education on two attitudes as exemplified by stressing them in connection with teaching over a period of one year. The attitudes were: 1) scientific open-mindedness, and 2) preference of outdoors to movies. The subjects were about nine hundred children in the intermediate grades of the public schools. Three tests were used to test the first attitude, and ballots and diaries were used to test the second. It was found that superstitions were significantly reduced by the experimental procedure; social attitudes, scientific attitudes, and preference for movies over outdoors were not affected by the procedure. Neither grade, age, intelligence, nor sex were significantly related to performance on the tests.

II

The answer to the question posited at the close of the first chapter seems to be *yes* and *no*. The schools seem able to increase resistance to superstitions by stressing open-mindedness. They do not seem able effectively to decrease prejudice or to increase scientificness by the same means. Nor do they seem able seriously to affect choice of activities such as going outdoors or going to the movies by stressing preference of outdoors in the same way.

A number of suggestions for further experimentation should be one outcome of this piece of research, perhaps the principal one. We list a few:

1) Some means other than paper-and-pencil responses should be worked out to get at actual conduct in a given situation. For example, the choice presented in the ballots could actually be offered to the children and some means adopted to see that they had to carry out their choices. This might be done

by presenting them with a street car token or a ticket to a movie, according to their choice. The value of the anonymousness of the ballots could be determined by a similar technique.

2) A similar experiment ought to be worked out in another field of education: e. g., civics. The transfer of the attitudes from civics to other fields could then be determined. Civic attitudes should afford more opportunities for measurement in life situation, for children at least, than do scientific attitudes.

3) The question of carry-over is an interesting one. There are some indications that the attitudes taught at one time, operate more strongly later. This may be due to the facilitating influence of a particular season, or of a particular situation, or of maturation. It would be extremely valuable to determine whether there is any such carry-over and how it works. The experimental subjects in this study perhaps, or a select group of them who made considerable gains, could be tested again in a year or two and compared with a different group altogether.

4) The influence of the attitudes of the teachers should somehow be determined and perhaps partialled out of the scores of their respective classes. Some such technique was used by Smith.[1] It was not feasible in the present study. Only two of more than a score of teachers were willing even to rate the test items in the order of their importance. None would take the tests.

5) An experiment ought to be done with the experimental factor a carefully worked unit in attitude-teaching and with each step carefully defined. This would be similar to some studies reviewed in the first chapter, for example that of Biddle [2] and that of Caldwell and Lundeen.[3] It would be interesting to see whether this makes any difference.

6) Still another group added to such an experiment as

[1] Smith, H. B., A Social Attitudes Test for Upper Grade Children (unpubl. Doctor's Dissertation, Teachers College, Columbia University, 1930).
[2] Biddle, W. W., *op. cit.*
[3] Caldwell, O. W. and Lundeen, G. E., *op. cit.*

this would be illuminating. In this group attitudes could be vaguely discussed, in language beyond the comprehension of the children, so that any gain would not be due to direct stress. It might seem that the control group in our present experiment fulfilled this function, since the attitudes are listed in the course of study for the teacher's guidance.

7) It would be interesting to determine the extent to which open-mindedness influences omission of items on such tests as those used in this experiment. The difference between instructing subjects to omit items about which they are doubtful and saying nothing about such items in the instructions could also be learned.

8) The gain in knowledge of a certain unit should be compared with the gain in attitudes resulting from the study of the unit. It is possible that some groups will exceed in knowledge gain and some in attitude gain. This may vary with the particular subject, unit, teacher, pupils, and methods of teaching.

9) On the Frederick test space is provided for the subject to list nations and races he especially dislikes. This was not considered in the present study. It might be of interest to determine the relationship between the size of such a list and the prejudice score.

It is the intention of the present writer to carry out as many of these ideas as he can. The field, however, is open.

APPENDIX A

The following references are cited in this work: *

Allport, G. W., Composition of Political Attitudes, Am. J. Sociol., 35 (1929), 220-238.

Allport, F. H. and Hartman, O. A., The Measurement and Motivation of Atypical Opinion in a Certain Group, Am. Pol. Sci. Rev., 19 (1925), 4, 735-760.

Bain, R., An Attitude on Attitude Research, Am. J. Sociol., 33 (1928), 940-957.

Biddle, W. W., Propaganda and Education, N. Y., Teachers College Bureau of Publications, 1932 (T. C. Contribution No. 531).

Bogardus, E. S., Social Distance and Its Origins, J. Appl. Sociol., 9 (1925), 216-226.

Caldwell, O. W., Science—Truth or Propaganda, Sch. Sci. & Math., 33 (1933), 1, 26-33.

Caldwell, O. W., and Lundeen, G. E., Changing Unfounded Beliefs—A Unit in Biology, Sch. Sci. & Math., 33 (1933), 4, 394-413.

———, An Experimental Study of Superstitions and Other Unfounded Beliefs as Related to Certain Units of General Science, N. Y., Teachers College Bureau of Publications, Columbia University, 1932, 138 pp.

Campbell, W. G. and Koch, H. L., Student Honesty in a University With an Honor System, Sch. & Soc., 31 (1930), 232-240.

Cantril, H., General and Specific Attitudes, Psychol. Monog., 42 (1932), 5, 192, 109.

Charters, W. W., Developing the Attitudes of Children, Education, 53 (1933), 353-357.

Chen, W. K-C., The Influence of Oral Propaganda Material Upon Students' Attitudes, Arch. Psychol., 1933, No. 150, 43 pp.

City of Baltimore Department of Education, Elementary Science Course of Study for Grades 4, 5, and 6, Baltimore, 1929.

Clark, E. L., Study of Fair-mindedness in Oregon Institute of Technology, 1930 (unpublished; abstract in U. S. Gov. Bull, 1931, No. 13).

Conklin, E. S., Superstitious Belief and Practice Among College Students, Am. J. Psychol., 30 (1919), 83-102.

Counts, G. S., The American Road to Culture, N. Y., John Day Co., 1930, 194 pp.

Curti, M. W., Child Psychology, N. Y., Longmans, Green & Co., 1930, 527 pp.

Curtis, F. D., Some Values Derived From the Extensive Reading of General Science, N. Y., Teachers College Bureau of Publications, 1924 (T. C. Contribution No. 163).

Davis, J., Testing Social Attitudes of Children in the Government Schools in Russia, Am. J. Sociol., 32 (1923), 947-952.

Dewey, John, Human Nature and Conduct, N. Y., Henry Holt & Co., 1922, 332 pp.

* This list is by no means intended as a complete survey of the field. It includes a number of important bibliographies. A few studies are included which are related to the problem, but not considered in the text.

Downing, E. R., Does Science Teach Scientific Thinking? Sci. Ed., 17 (1933), 2, 87-89.
Droba, D. D., Education and Negro Attitudes, Sociol. & Soc. Res., 17 (1932), 137-141.
———, Methods for Measuring Attitudes, Psychol. Bull., 29 (1932), 309-323.
Dudycha, G. J., The Superstitious Beliefs of College Students, J. Abn. & Soc. Psychol., 27 (1933), 457-464.
Frederick, R., Investigation into Some Social Attitudes of High School Pupils, Sch. & Soc., 25 (1927), 410-412.
Garrett, H. E. and Fisher, T. R., The Prevalence of Certain Popular Misconceptions, J. Appl. Psychol., 10 (1926), 411-420.
Garrison, K. C. and Mann, M., A Study of the Opinions of College Students, J. Soc. Psychol., 2 (1931), 168-178.
Gilliland, A. R., A Study of the Superstitions of College Students, J. Abn. & Soc. Psychol., 24 (1930), 472-479.
Gould, R. L., Superstitions Among Scottish College Girls, Ped. Sem., 28 (1921), 203-248.
Green, G. H., Have Children a National Bias? Discovery, 13 (1932), 44-46.
Guilford, J. P., Racial Preferences of 1000 American University Students, J. Soc. Psychol., 2 (1931), 179-204.
Haag, H. L., Study of Racial Attitudes of High School and University Students, Master's Thesis, Univ. of Michigan, Ann Arbor, 1930.
Harper, M. H., Social Beliefs and Attitudes of American Educators, N. Y., Teachers College Bureau of Publications, 1927 (T. C. Contribution No. 294).
Hartshorne, H., May, M., Maller, J. B. and Shuttleworth, F., Studies in Deceit, 720 pp.; Studies in Service and Self-Control, 560 pp.; Studies in the Organization of Character, 503 pp., N. Y., Macmillan Co., 1928-30.
Humke, H. L., An Experiment in Measuring Changes in Pupil Attitudes Affected by Teaching, Bull. of Sch. of Ed., Indiana Univ., 10 (1933), 5-11.
Hurd, A. W., Appreciational Objectives in Science Teaching, Sch. & Soc. 37 (1933), 124-126.
Jones, E. S., Opinions of College Students, J. Appl. Psychol., 10 (1926), 427-436.
Katz, D. and Allport, F. H., Students' Attitudes, Syracuse, Craftsman Press, 1931, 408 pp.
Kelley, T. L., Scientific Method, N. Y., Macmillan Co., 1932, 233 pp.
Kolstad, A., A Study of Opinions on Some International Problems, N. Y., Teachers College Bureau of Publications, 1933 (T. C. Contribution No. 555).
Kornhauser, A. W., Changes in Information and Attitudes of Students in an Economics Course, J. Ed. Res., 22 (1930), 4, 288-298.
Lapière, R. T., Race Prejudice: France and England, Soc. Forces, 7 (1928), 102-111.
Lasker, B., Race Attitudes in Children, N. Y., Henry Holt & Co., 1929, 394 pp.
Lund, F. H., The Psychology of Belief, J. Abn. & Soc. Psychol., 20 (1925-26), 63-81, 174-195.
Lundberg, G. A., The Demographic and Economic Basis of Political Radicalism and Conservatism, Am. J. Soc., 22 (1927), 5, 719-732.
———, Sex Differences on Social Questions, Sch. & Soc., 23 (1926), 595-600.
Lundeen, G. E. and Caldwell, O. W., Study of Unfounded Beliefs Among High School Seniors, J. Ed. Res., 22 (1930), 257-273.

Maller, J. B., Cooperation and Competition, N. Y., Teachers College Bureau of Publications, 1929 (T. C. Contribution No. 384).
———, Studies in Character and Personality in German Psychological Literature, Psychol. Bull., 30 (1933), 3, 209-232.
Maller, J. B. and Lundeen, G. E., Sources of Superstitious Beliefs, J. Ed. Res., 26 (1933), 5, Jan., 321-343.
May, M. A., Problems of Measuring Character and Personality, J. Soc. Psychol., 3 (1932), 131-145.
McDonough, Sister Mary Rosa, The Empirical Study of Character, Catholic University of America, Studies in Psychology and Psychiatry, Baltimore, Williams & Wilkins Co., vol. 2 (1929), nos. 3-4.
Meltzer, H., Children's Social Concepts, N. Y., Teachers College Bureau of Publications, 1925 (T. C. Contribution No. 192).
Moore, E. B., A Study of Scientific Attitudes as Related to Factual Knowledge, Sch. Rev., 38 (1930), 5, 379-386.
Moore, G. and Garrison, K. C., A Comparative Study of Social & Political Attitudes of College Students, J. Abn. & Soc. Psychol., 27 (1932), 27, 195-208.
Moore, H. T., Innate Factors in Radicalism and Conservatism, J. Abn. & Soc. Psychol., 20 (1926), 234-244.
Murphy, G. B. and L. B., Experimental Social Psychology, N. Y., Harper's, 1931, 709 pp., chaps. 10, 11.
Neumann, G. B., Study of International Attitudes of High School Students, N. Y., Teachers College Bureau of Publications, 1926 (T. C. Contribution No. 230).
Nixon, H. K., Popular Answers to Some Psychological Questions, Am. J. Psychol., 36 (1925), 418-423.
Payne Fund Studies, Motion Pictures and Youth, N. Y., Macmillan Co., 1933.
Peterson, R. C. and Thurstone, L. D., Effect of a Motion Picture Film on Children's Attitudes Toward Germans, J. Ed. Psychol., 23 (1932), 4, 241-246.
Powers, F. F., Influence of Intelligence and Personality Traits Upon False Beliefs, J. Soc. Psychol., 2 (1931), 490-493.
Powers, S. R., Science in Education, Address at Twelfth Annual Meeting of Science Association of Middle States, Atlantic City, Nov. 1932 [abst. in Science Ed., 17 (1933), 2, 171-172].
Reinhardt, J. M., Students and Race Feeling, Survey, 61 (1928), 239-240.
Rice, S. A., Stereotypes: A Source of Error in Judging Human Character, J. Personnel Res., 5 (1926-27), 267-276.
Schlorff, P. W., An Experiment in the Measurement and Modification of Racial Attitudes in School Children, Doctor's Dissertation, N. Y. Univ., 1930, unpub. [abst. in U. S. Gov. Bull., 66 (1932)].
Shales, J. M., A Study of Mind-Set in Rural and City Children, J. Ed. Psychol., 21 (1930), 246-258.
Sherman, M., Theories and Measurements of Attitudes, Child Development, 3 (1932), 15-28.
Shuttleworth, F. K., Influence of Early Religious Home Training on College Sophomore Men, Rel. Ed., 22 (1927), 57-60.
Sinclair, J. H. and Tolman, R. S., An Attempt to Study the Effect of Scientific Training Upon Prejudice and Illogicality of Thought, J. Ed. Psychol., 24 (1933), 5, 362-370.
Smith, Harry B., A Social Attitudes Test for Upper Grade Children, Doctor's Thesis, Teachers College, Columbia University, 1930, unpub.
Sorokin, P. A., Experimente zur Soziologie, Zschf. f. Völkersychol. u. Soziol., 1928, 4, 1-10.

Stauffer, S. A., Experimental Comparison of Statistical and Case History Technique of Attitude Research, Pub. Am. Sociol. Soc., 25 (1931), 154-156.
Strauss, Samuel, Some Results from Tests of Scientific Thinking, Master's Thesis, Chicago, 1931, unpub. (abst. in U. S. Gov. Bull., 1932, p. 54).
Symonds, P. M., Diagnosing Personality and Conduct, N. Y., Century Co., 1931, 602 pp.
———, A Social Attitudes Questionnaire, J. Ed. Psychol., 16 (1925), 316-322.
Thirty-first Yearbook of the N. S. S. E., Part I: A Program for Teaching Science, Bloomington, Pub. Sch. Pub. Co., 1932, 370 pp.
Thurstone, L. L., Motion Pictures and Children's Attitudes, J. Soc. Psychol., 2 (1931), 291-305.
Thurstone, L. L. and Chave, E. J., The Measurement of Attitudes, Chicago, Univ. of Chicago Press, 1929, 96 pp.
Vetter, G. B., Study of Social and Political Opinions, J. Abn. & Soc. Psychol., 25 (1930), 26-39.
Vincent, M. J., Influence of Drama Upon Human Attitudes, Sociol. & Soc. Res., 17 (1932), 142-152.
Voelker, P. L., The Function of Ideals and Attitudes in Social Education, N. Y., Teachers College Bureau of Publications, 1921 (T. C. Contribution No. 112).
Wagner, M. E., Superstitions and Their Social and Psychological Correlatives Among College Students, J. Ed. Sociol., 2 (1928), 26-36.
Watson, G. B., Character and Personality Tests, Psychol. Bull., 30 (1933), 7, 467-487.
———, Character Tests and Their Applications Through 1930, Rev. Ed. Res., 3 (1932), 185-270.
———, Does World-Mindedness Depend Upon Good Will or Information? Upon Character or Intelligence? Rel. Ed., 21 (1926), 188-194.
———, Experimentation and Measurement in Religious Education, N. Y., Association Press, 1927, 295 pp.
———, The Measurement of Fair-Mindedness, N. Y., Teachers College Bureau of Publications, 1925 (T. C. Contribution No. 176).
———, Measures of Conduct and Personality, Psychol. Bull., 29 (1932), 147-176.
Weller, F., Attitudes and Skills in Elementary Science, Science Ed., 17 (1933), 2, 90-97.
Whitelaw, H. and Laslett, H. R., A Further Study of the Acceptance of Popular Misbeliefs Among College Students, Kadelpian Rev., 11 (1932), 297-300.
Willey, M. and Rice, S. A., William Jennings Bryan as a Social Force, J. Social Forces, 2 (1924), 338-344.
Willoughby, R. R., A Sampling of Student Opinion, J. Soc. Psychol., 1 (1930), 164-169.
Women's Education Club of U. C. L. A., The Child's Reaction to the Movies, Pi Lambda Theta Journal, 10 (1931), 4, 11-19.
Young, D., Some Effects of a Course in American Race Problems on the Race Prejudice of 450 Undergraduates at the University of Pennsylvania, J. Abn. & Soc. Psychol., 22 (1927), 235-242.
Young, K., Social Psychology, N. Y., F. S. Croft & Co., 1930, 674 pp.
———, Source Book in Social Psychology, N. Y., F. S. Crofts & Co., 1927, 844 pp.
Zyve, C., Experiments in the Teaching of Integrity, T. C. Rec., 32 (1931), 359-374.

APPENDIX B

Samples of the tests which were used in the experiment are given herewith. It should be understood that the credit for the tests goes to the respective authors, but criticism comes to the present experimenter since the changes as well as the uses of the tests for this particular purpose were done entirely on his own responsibility with the kind permission of authors and publishers.

GARRETT-FISHER TEST

Name..... Age.... Grade.... School.....

If you think the statement is true, make a circle around the T; if you think it is not true, make a circle around the F.

T F 1. Man has five senses.
T F 2. A child comes into the world already knowing good from evil.
T F 3. Certain lines in a person's hand foretell his future.
T F 4. If you stare at a person's back, you can make him turn around.
T F 5. It is unlucky to have anything to do with number 13.
T F 6. You can tell a person's character by the size and place of the bumps on his head.
T F 7. People with greenish eyes cannot be trusted as much as people with black or blue eyes.
T F 8. Men are more sensible than women.
T F 9. People born under the influence of certain stars show this in their characters.
T F 10. The weather man can usually tell ahead what the weather will be.
T F 11. Long, slender hands show an artistic nature.
T F 12. Starting something on Friday is almost sure to bring bad luck.
T F 13. If a man had faith enough, he could heal a broken limb.
T F 14. Many great men have been feeble-minded in childhood.
T F 15. Some animals are as bright as the average man.
T F 16. No sickness or disease can stop us if we have enough will power.
T F 17. Grown-up people sometimes becomes feeble-minded from over-study.
T F 18. All men are created equal—able to do the same things.
T F 19. If cousins get married, their children are sure to be feeble-minded.
T F 20. Very bright children are likely to be weak and sickly.
T F 21. Studying arithmetic is valuable because it makes you think clearly.
T F 22. A person's face tells you pretty well how bright he is.
T F 23. A square jaw is a sign of will power.
T F 24. A high forehead shows brains.
T F 25. A person who does not look you in the eye is likely to be dishonest.

T F 26. Women are nobler than men by nature.
T F 27. Man is higher than animals because he thinks before he acts.
T F 28. You can catch any sickness by thinking too much about it.
T F 29. Blondes cannot be trusted as much as brunettes.
T F 30. Cold hands are the sign of a warm heart.
T F 31. A person who holds his thumbs in his hands is a coward.
T F 32. If your ears burn, it is a sign that someone is talking about you.
T F 33. Your conscience will always tell you the right thing to do.
T F 34. Silent men are generally deep thinkers.
T F 35. Fat people are always good natured.
T F 36. Some animals' coats change with the seasons.
T F 37. Chess and checker playing develop one's power of thinking.
T F 38. The slow learner remembers what he learns better than the quick learner.
T F 39. Brains and beauty seldom go together.
T F 40. Some people are born to be unlucky.

FREDERICK TEST

Name..... Age.... Grade.... School.....

If you think the statement is true, make a circle around the T; if you think it is not true, make a circle around the F.

T F 1. The Japanese people cannot be trusted.
T F 2. The League of Nations has been a failure.
T F 3. The offices of the League of Nations are in France.
T F 4. The United States should have the largest army and the strongest navy in the world.
T F 5. The best way for a country to prevent war with other nations is to have a strong military power.
T F 6. Germany should not be allowed to trade with other nations.
T F 7. The United States should trade with other nations as little as possible.
T F 8. Christian peoples are much better than other peoples.
T F 9. America has not produced many great musicians.
T F 10. Longfellow is the world's greatest poet since Homer.
T F 11. The Italians have done little to make the world better.
T F 12. The Russians are a low grade people.
T F 13. The United States has never mistreated people of any other race or nation.
T F 14. The American government is not the fairest in the world.
T F 15. No patriotic American would admit that any other nation is better than America in anything.
T F 16. Most of the world's best books were written by Americans.
T F 17. The American people obey their laws more than any other people.
T F 18. Nations cannot act by themselves any longer; they must get together.
T F 19. America, my country, may she ever be right; but my country, right or wrong.
T F 20. The English Parliament is the finest lawmaking body in the world.
T F 21. The United States should conquer and develop Mexico.
T F 22. All white people feel some dislike toward Negroes.

T F 23. All Negroes are more likely to steal than white people.
T F 24. No white people dislike the Indians.
T F 25. Any pure white American is brighter than any Negro.
T F 26. Any person of one color or race should be permitted to marry a person of another color or race if both are willing.
T F 27. Every job should be open to anyone who can do the work, no matter what his color or race.
T F 28. The yellow race is the equal of the white race and some day may be greater.
T F 29. Lying is always wrong.
T F 30. Everyone who is not ill should go to church on Sunday.
T F 31. All the wars the United States has fought have done more harm than good.
T F 32. The church is more for the rich than for the poor.
T F 33. Preaching to people makes them better.
T F 34. It is bad for the people to have everything open on Sunday.

PART II

1. Make a list of any races of people you do not like:
2. Make a list of countries or nations you do not like:

TEST OF SCIENTIFIC ATTITUDES

Name..... Age.... Grade.... School.....

On these pages you will find a number of statements and problems, which you are to answer as briefly as possible. Some questions have answers all ready; in those you are to mark the *best* answer by putting an X in front of it. In other questions you will have to write the answer yourself. Be brief. If you cannot answer the question, write the reason.

1. A little boy is looking over a board fence so that only his head can be seen. The fence is five and one-half feet high, and the little fellow's head is six inches above the top of the fence. How tall is he?

Answer.....

2. Two men together can walk four miles in one hour. How long would it take each by himself to walk the same distance?

Answer.....

3. If the air were always as full of moisture as it could be, a wet cloth would never dry out.

True False

4. A well known naturalist reports that he saw a white crow in a flock of ordinary black ones.

(a) The report couldn't possibly be true.
(b) It might be true, but isn't very likely to be.
(c) I won't believe it until I see the white crow.
(d) It might be true, and probably is.

5. A famous astronomer published the statement that if you could put a pail of water in the sunlight on the moon, the water would soon boil away; but that if while it was boiling the water was moved into the shade, it would very quickly freeze.

(a) This statement might be and probably is true.
(b) It couldn't possibly be true.

(c) It might be, but is very unlikely to be true.
(d) I am unwilling to believe this, because it can't be proved.

6. A man happens to wake in the night just as the clock strikes three. He immediately drops asleep again, but though usually a sound sleeper, he wakes the next night again just as the clock strikes three. He thinks very little of it, but the third night he again wakes just as the clock strikes three, and hears somebody trying to break into the house. The man concludes that in some way his waking on the two nights before the attempted burglary was a warning, or at least had something to do with the burglary.

(a) The man's conclusion is undoubtedly true.
(b) It is very unlikely that his conclusion is true.
(c) It is unlikely that his conclusion is true.
(d) It is probably true.

7. The warden in a prison noticed that every man in the prison serving a sentence for theft or burglary had flat and blunt fingers. He concluded that flat and blunt fingers showed a dishonest nature.

True False

8. Minnie is 12 years old now. Sue is six years older than Minnie, who is four years younger than Emma. If Emma will be 17 a year from now, how old was Minnie a year ago?

Answer.....

9. You are given a locked padlock and a box containing several hundred loose keys, among which is the right key. You are in a hurry to unlock the padlock. Which would be the best and quickest way to unlock it?

(a) See whether the keyhole looks as if it would require a flat key or a round one to open it. Then try one after another of the right kind, flat or round, until you come to the right key.
(b) If it is a big padlock, pick out and try one after another only the large keys until you come to the right one; if it is a small padlock, do the same with the small keys.
(c) Try any key you happen to pick up, and if it doesn't happen to fit toss it aside and try the next one you happen to pick up, and so on until you pick up the right one.
(d) Before trying any key in the lock, examine the key-hole carefully and then pick out of all the keys the most promising looking ones. Try the most likely looking one first, then the next most likely looking one, and so on until you come to the right one.

10. A newspaper article under the heading, "Rat Shows Pity," stated that a man saw two rats running slowly alongside each other, both holding the same stick in their mouths. Upon looking closer, the man discovered that one rat was blind, and that the other was carefully leading him along with the twig.

(a) The conclusion in the heading might be and probably is true.
(b) The conclusion is true, for rats are very intelligent animals.
(c) It might be true, but is very unlikely to be.
(d) The conclusion is unlikely to be true.

11. The following account appeared in a newspaper some time ago: Once the late Mme. Nordica, a very famous soprano singer, was singing at the home of a friend. The party were upon the veranda, since it was a warm summer evening. Shortly after Mme. Nordica began

to sing, a toad hopped upon the walk nearby and remained quietly through her entire song. Other singers of less ability than Mme. Nordica followed, and immediately the toad hopped out of sight and remained hidden during their solos. But when Mme. Nordica sang her second number, the toad again hopped upon the walk and remained in sight again until she had finished her singing.

(a) It is possible that toads, like some snakes, are charmed by music.
(b) The toad just happened to appear during Mme. Nordica's second number.
(c) The toad came back as a tribute to Mme. Nordica.
(d) Something other than music attracted the toad during Mme. Nordica's solos.

12. I needed the lights yesterday morning, but when I pushed the wall button none of the electric lamps would light. I immediately concluded that the power must off in the main line.

True False

13. A very vicious bull saw a man in a red sweater crossing his pasture and attacked the man. The bull attacked the man because of the red color of the sweater.

True False

14. I flip up a coin and it comes down heads four times in succession. But the chances are exactly even that if I flip it up again it will again come down heads, though that would make it five times heads in succession.

True False

15. A certain aviator always carried a clover leaf when he flew, to give him good luck. One day he fell and was badly injured. He found that, without knowing it until after his fall, he had lost his clover leaf during his flight. He concluded that his fall was due to the loss of his good luck charm, the clover leaf.

(a) The conclusion is true.
(b) It is absurd.
(c) It might be and probably is true.
(d) It might be but is unlikely to be true.

16. A sea-captain who recently returned from a long voyage, stated that he had landed upon a small, barren island, upon which he saw no living creatures but common rats with very pink tails. He wondered what they ate; whether they preyed upon each other, as there seemed to be nothing else for them to eat. Presently he saw three or four big rats go down to the rocks at the water's edge, turn around and dip their tails into the water. Soon one gave a leap, and threw several feet away up on the rocks a crab, which had fastened on to its tail. The rat pounced upon the crab's back, succeeded in tearing off the shell, and devoured the crab.

(a) The account might be true and probably is.
(b) I would believe it only if I saw it happen.
(c) It might be true, but is very unlikely to be.
(d) The account is doubtless true, for rats are very clever animals.

17. A few years ago a famous naturalist known all over the world announced that he had found in South America a bird which had a head something like a lizard's, a tail something like a parrot's, and which cracked and ate nuts. Nobody else had ever reported having seen or heard of such a creature.

(a) I will not believe the account until I see the bird.
(b) The account might be true, but is very unlikely to be true.
(c) It couldn't possibly be true.
(d) It might be and probably is true.

18. A certain centerfielder never fails to touch second base with his left heel when he passes it on his way out to centerfield or in to bat. Coming in to bat during an important game he failed to touch the base with his heel in passing though he thought he had done so. Although a very good batter, he struck out that same inning with the bases full, and thereby lost the game for his team. The reason for this was his failure to touch the base as usual.
(a) This reason might be and probably is true.
(b) This reason is undoubtedly true.
(c) This reason is absurd.
(d) It is unlikely to be but could be sound.

19. A friend of mine once saw a mouse fall into a stream. While it was swimming in the water, a large salmon leaped up and snapped up the mouse. The man therefore concluded that if he could manage to bait a hook with a live mouse, he would be sure to catch a salmon.
True False

20. In Italy many believe that certain people become accursed with the "Evil Eye" so that they themselves are followed by misfortune, and anybody who has anything to do with them, also becomes the victim of many misfortunes.
(a) In the cases of some people the belief is probably true.
(b) There is very little doubt that the belief is true.
(c) It is hardly likely that such a belief could have a sound reason.

21. A new kind of fruit jar is advertised. A woman decided to give it a trial and buys one. But the fruit she cans in it spoils and she therefore concludes that the new type of jar is not a success.
True False

22. During a game of checkers after your opponent has made a certain move you find that you can either jump his only king or jump two of his other men and land in his king-row. Which should you do?
Answer.....

23. A letter correctly addressed to the home of Mr. John Smith, New York City, is missent first to Chicago, then is forwarded to San Francisco, and finally reaches Seattle, Washington. Where does Mr. Smith live?
Answer.....

24. About twenty-five years ago a newspaper printed an account of a baby which, when only two hours old, spoke a complete sentence in perfect English and then died.
(a) The account might be true but is very unlikely to be.
(b) The account is doubtless true.
(c) It might be and probably is true.
(d) It couldn't possibly be true.

25. You have a package valued at ten dollars to send to Mr. Smith in Pasadena, California. Which way would you choose to get the package to him:
(a) Registered mail costing a dollar to send it.
(b) Insured parcel post for thirty-one cents.

(c) Give it to a friend to take to Mr. Smith. The friend will soon leave for Pasadena and though he does not know Mr. Smith, he is willing to try to find him for you, and give him the package, and of course he will charge you nothing for delivering it.

(d) Insured express costing forty-three cents.

26. A famous naturalist stated during a recent lecture that in the jungles of southern Asia he one day killed a full grown male deer which he carried home whole in his hunting coat pocket.

(a) The account might be and probably is true.

(b) I would believe the account only if I saw the deer.

(c) The account is absurd.

(d) It might be, but is very unlikely to be true.

27. Not long ago a miner returning from Alaska reported that on the frozen tundras, where he believed no other man, Indian or white, except himself had ever been, he actually saw a live mastodon or mammoth.

(a) It is undoubtedly true.

(b) His report is unlikely to be true.

(c) I wouldn't believe the report unless I saw the mammoth or mastodon myself.

(d) His report might be true but is very unlikely to be.

VITA

Arthur Lichtenstein was born in Baltimore on May 6, 1906. He attended the Baltimore public schools and was graduated from the Baltimore City College in June, 1923. In 1925 he entered the Maryland State Normal School at Towson, whence he was graduated in 1927. From 1927 to 1932 he taught in the Baltimore public schools, at the same time completing the requirements for the B. S. degree at The Johns Hopkins University and the M. A. degree at Teachers College, Columbia University. He entered the graduate school of The Johns Hopkins University in 1931, and was awarded the Buchner Scholarship in Education in 1932. In 1933 he was appointed instructor in the College for Teachers and assistant in the School of Higher Studies in Education. In 1934 he was appointed Instructor in Education. Honorary fraternities, Phi Delta Kappa, Phi Beta Kappa.